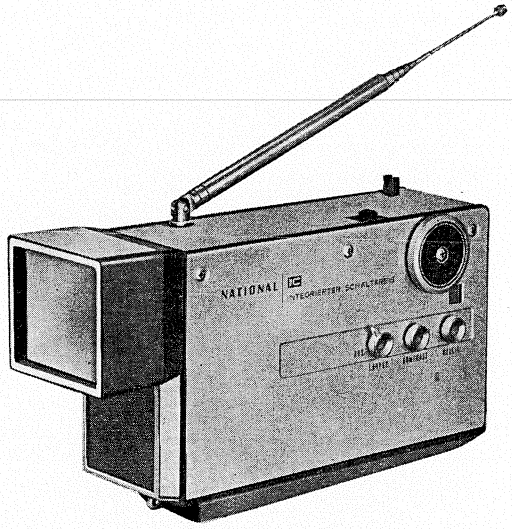
ORDER NO. FTD 701001

NATIONAL Service Manual

PERSONAL PORTABLE TELEVISION RECEIVER

MODEL TR-001EU



SPECIFICATIONS

Power Input Rating	DC : 5V, AC : 220V 50Hz with AC Adaptor TY-196E
Power Consumption	DC : 1.7W, AC : 9.5W max. with AC Adaptor TY-196E
Antennas	VHF and UHF Rod antenna : 75 Ohm Unbalanced VHF and UHF External antenna : 75 Ohm Unbalanced
Channels	VHF 2-12 ch., UHF 21-69ch., CC1R standard
IF. Frequency	Video 38.9 MHz Sound 33.4 MHz
Integrated Circuits	11
Transistors	8
Thermistor	1
Diodes	24
H. V. Rectifier	1 block (11 diodes)
Picture Tube	IVABP4/S4047 36° deflection, aluminized 7cm²
	Heater Voltage 2.0V Heater Current 90mA
Speaker	3.8cm dynamic
Sound Output	Max. 100mW
Automatic Circuits	Peak AGC AVR (Automatic Voltage Regulator) AOCP (Automatic Over Charge Protector) Automatic Noise Canceller
Dimensions	Height : 11cm Width : 6cm Depth : 19cm (with front hood)
Weight	895g (with Battery)
Battery	1 (NATIONAL Nickel Cadmium Battery Pack TY-701E)

〈EXPORT DIVISION〉
MATSUSHITA ELECTRIC TRANDING CO., LTD.
P, O. BOX 288, Central Osaka. Japan

MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.
FUJISAWA TELEVISION DEPARTMENT

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1. ADJUSTMENT LOCATIONS

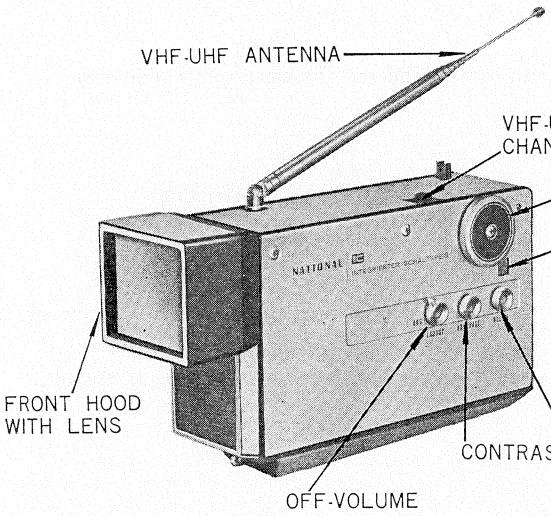


Fig. 1-1

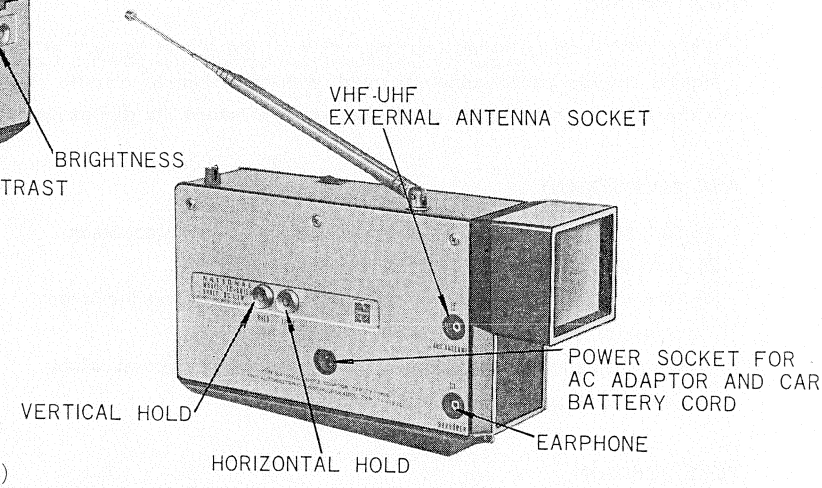


Fig. 1-2

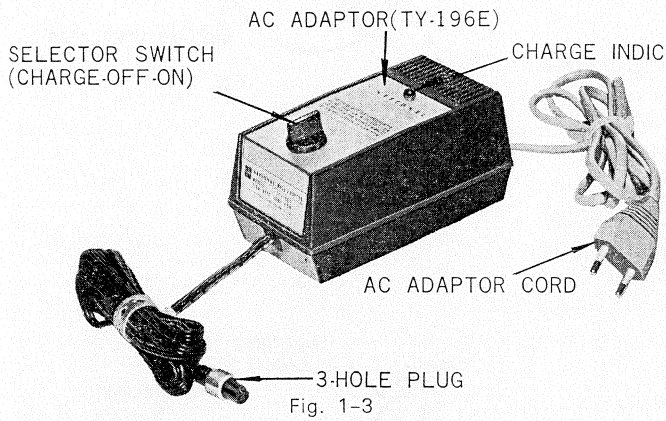


Fig. 1-3

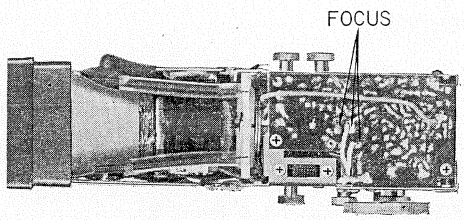


Fig. 1-4

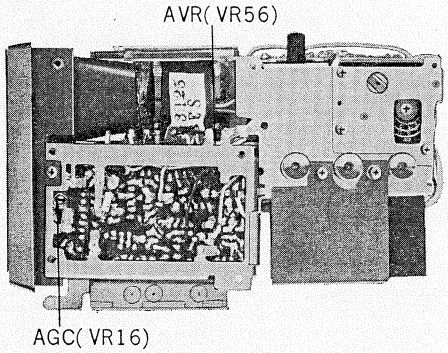


Fig. 1-5

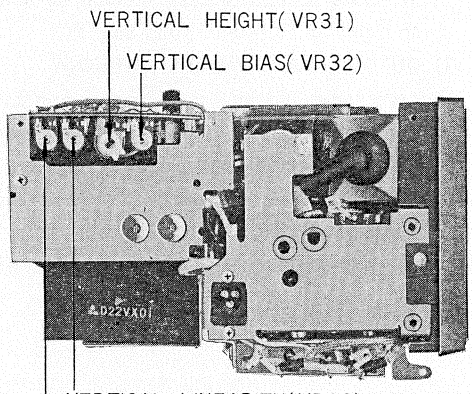


Fig. 1-6

2. RECEIVER ADJUSTMENTS

VERTICAL HEIGHT AND VERTICAL LINEARITY (Fig. 1-6)

Set the power supply voltage to 4.5V, maintain a satisfactory linearity and extend the vertical height completely.

FOCUS (Fig. 1-4)

Change focus voltage to 0 V or 40 V or 80 V and make adjustment for the sharpest and clearest picture.

AGC (Fig. 1-5)

If the AGC knob is turned counterclockwise, the operating point of AGC changes to actuate the noise canceller through sync signals, so you cannot obtain a good, well-synchronized picture. This also results in a wiggle in the picture.
If the AGC knob is turned clockwise, receiver sensitivity decreases to a point where reception is no longer possible.

AGC ADJUSTMENT

1) Turn the receiver on for reception in normal reception areas.
2) Turn the contrast knob to the maximum position.
3) Turn the AGC knob (VR16) until the pattern contrast indicator shows black and white in proper contrast.
4) After adjustment, see if the picture becomes abnormal when selecting a specific station.

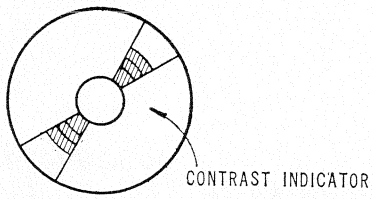


Fig. 2-1

YOKE POSITION

If the picture is slanted loosen the yoke clamp screw and make adjustment as required.

CENTERING

The picture centering device consists of two rings located at the rear of the yoke assembly. Turn each ring until the picture is properly centered on the CRT.

ANTENNAS (Fig. 1-1 & Fig. 1-2)

1) BUILT-IN VHF and UHF ROD ANTENNA
In normal reception areas, the built-in antenna provides a sharp and clear picture and good sound.
2) OUTDOOR VHF and UHF ANTENNA
An outdoor antenna should be used in an area where reception is of poor quality. Connect the antenna lead-in wire to the terminals of the matching unit (TNQ 311 with small coaxial cable), whose cable with a terminal should be connected to the terminal of the outdoor antenna.

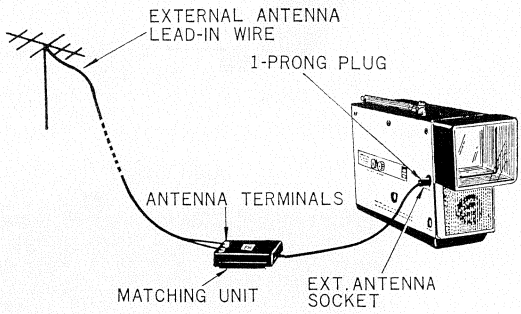


Fig. 2-2

3. DISASSEMBLY INSTRUCTIONS

CABINET

※ Remove the front hood with lens before the following disassembly.

1) Remove the battery compartment cover from the rear and take battery out.
2) Remove three screws Ⓐ, four screws Ⓑ and three screws Ⓒ shown in the photo. (Figs. 3-1, 3-2, 3-3)
3) Remove 6 control knobs.
4) Disconnect the lead from the antenna terminal inside the cabinet by heating with a soldering iron.
5) The cabinet can now be removed easily.

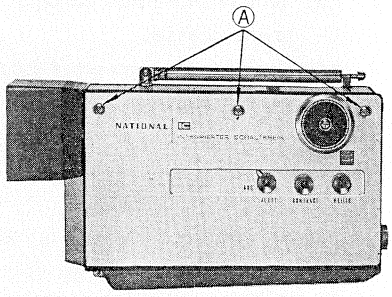


Fig. 3-1

ESCUTCHEON

1) Remove two screws Ⓓ and two other screws Ⓔ shown in the photo. (Fig. 3-4 & Fig. 3-5)
2) The escutcheon can now be separated easily from the chassis.

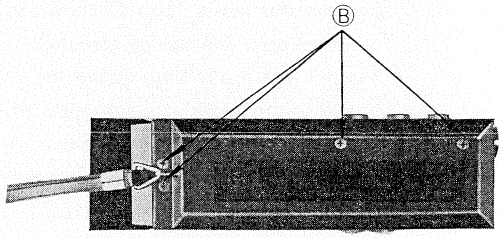


Fig. 3-2

PICTURE TUBE

1) After removing the cabinet, separate the escutcheon from the chassis.
2) Remove the CRT socket and anode cap.
3) Unsolder the blue, red, green and yellow yoke lead wires.
4) Remove two upper and two lower springs which connect the yoke with the escutcheon.
5) The CRT can now be removed easily.

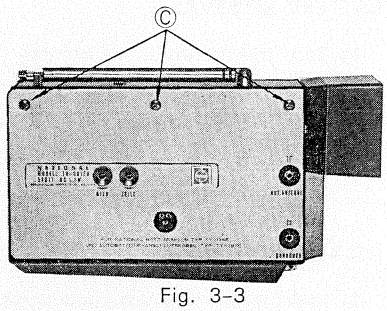


Fig. 3-3

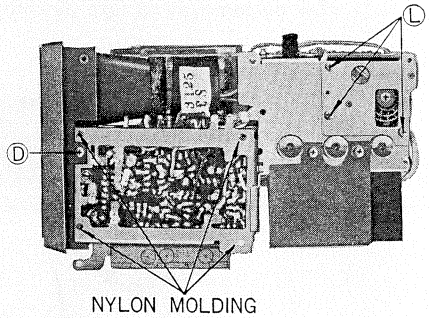
SPEAKER

1) Separate the escutcheon from the chassis.
2) Remove the screws that fasten the speaker and disconnect the leads from it.
3) The speaker can now be removed easily.

INSPECTION OR REMOVAL OF CIRCUIT BOARD

A) VIF, Video output, SIF, Sound output section (TNP 1122-21)

1) Remove the cabinet.
2) Separate the escutcheon from the chassis.
3) Remove the two screws Ⓗ shown in Fig. 3-7.
4) Remove the four nylon moldings which secure the printed circuit board to the chassis.
5) Unsolder the connected leads.
6) The circuit board can now be removed easily.



NYLON MOLDING
Fig. 3-4

B) Deflection section (TNP 1317-1)

1) Remove the cabinet.
2) Remove the two screws Ⓕ shown in Fig. 3-6
3) Remove one nylon molding which fastens the printed circuit board to the chassis.
4) Unsolder the connected leads.
5) The printed circuit board can now be removed.

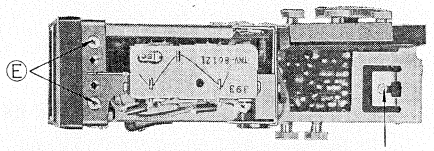


Fig. 3-5

C) FBT section

1) Remove the cabinet.
2) Remove the deflection printed circuit board TNP 1317-1
3) Remove the two screws Ⓖ shown in Fig. 3-6 and take the channel selector switch off the chassis.
4) Remove the two screws Ⓗ and two screws Ⓘ shown in Fig. 3-7.
5) Unsolder the leads connected to the following terminals of TNP-1122-21 : E_1, S, J, M, L, O_1, C, D, K, R, W.
6) Remove the two screws Ⓙ shown in fig. 3-8 and then the external power supply connecting terminal.
7) Remove the ground wire from the chassis shown in Fig. 3-8. Unsolder the red and black leads of the high-voltage rectifier.
8) Remove the one screw Ⓚ shown in Fig. 3-8 and the three screws Ⓛ shown in Fig. 3-4. And remove the tuning mechanism.
9) Loosen the mounting nut for the printed circuit board shown in Fig. 3-5.
   The printed circuit board can now be pulled rearward off the chassis.

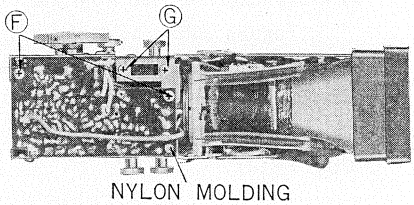


Fig. 3-6

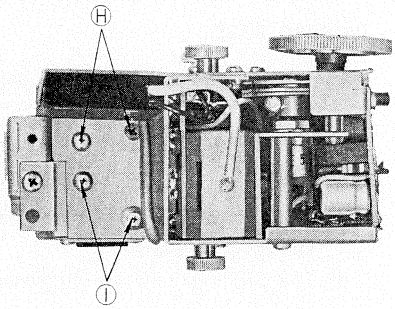


Fig. 3-7

BATTERY REMOVAL

1) Turn the battery compartment cover screw on the rear side counterclockwise and remove the battery compartment cover.
2) Push the battery cartridge forward and upward.

AC ADAPTOR

1) Pull the top selector knob upward until it comes out.
2) Remove two lower screws Ⓜ shown in Fig. 3-9. The case can now be removed to take out the inside.

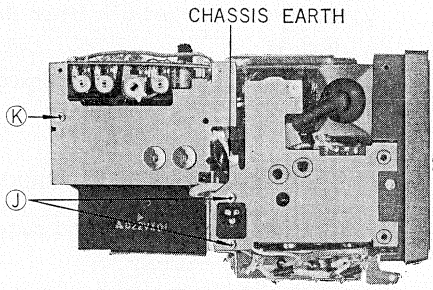


Fig. 3-8

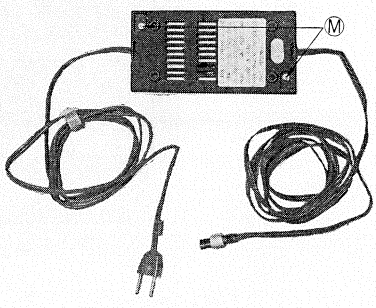


Fig. 3-9

4. ALIGNMENT INSTRUCTIONS

VIDEO IF ALIGNMENT

(Ⅰ) TEST EQUIPMENT CONNECTIONS (Fig. 4-1)

Oscilloscope ····· (V) Connect to the IC 12 ⑨ (TP. 3) with a 10KΩ resistor in series with the center wire of the shielded cable.

(H) Connect to the Sweep Generator to obtain horizontal deflection.

Sweep & Marker····· (1) Unsolder the junction of IC 16 terminal ④ and C155.

(2) Apply AGC bias to the terminal T of the printed circuit board TNP 1121-21 through the AGC bias circuit.

(3) Set the channel selector switch to VHF 2~4 and set the channel selector to the low end.

(4) Connect the sweep and marker generators to the VHF tuner test point (TP. 2)

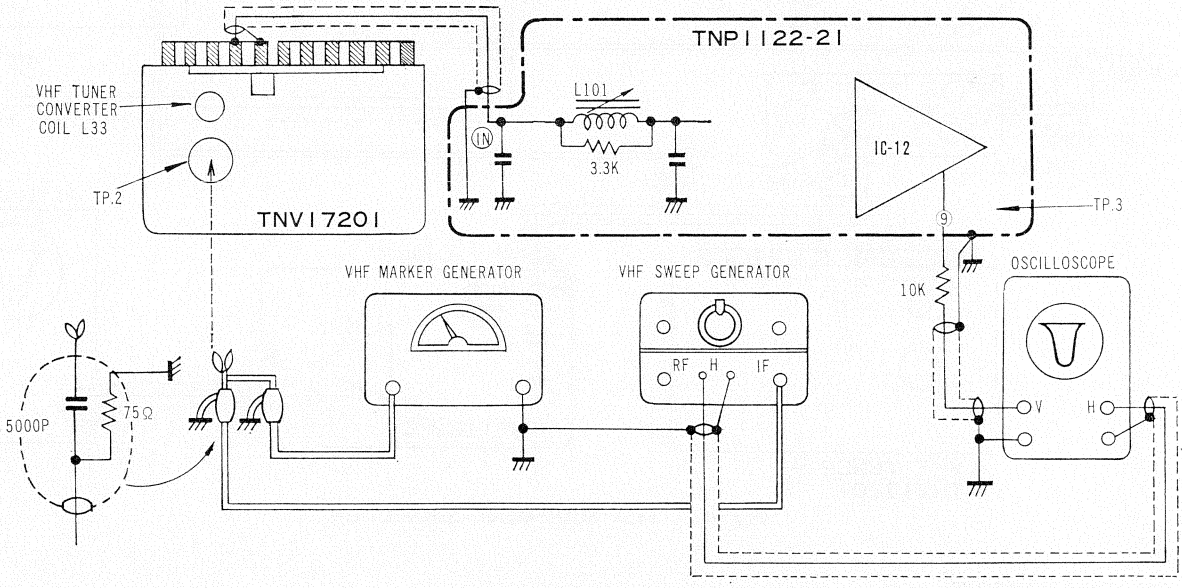


Fig. 4-1 TEST EQUIPMENT CONNECTIONS

(Ⅱ) ADJUSTMENTS

(1) Set AGC bias to 1.2 volts.

(2) Adjust the sweep output level to obtain about 300mV p-p on the response.

(3) Adjust both L101 (input coil) and L33 (tuner converter coil) to obtain the correct response curve as shown in Fig. 4-2.

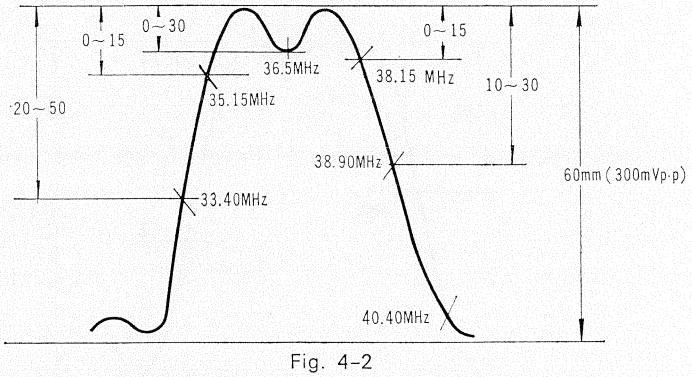


Fig. 4-2

UHF-VHF TUNER COUPLING ALIGNMENT (Fig. 4-3)

(I) TEST EQUIPMENT CONNECTION

Oscilloscope ..... (V) Connect to the test point (TP. 3) of the printed circuit board TNP 1122-21 with a 10KΩ resistor in series.

(H) Connect to the sweep generator to obtain horizontal deflection.

UHF Sweep Generator ..... Connect to UHF tuner input (UHF tuner input impedance 75Ω unbalanced)

VHF marker Generator ..... Connect to UHF tuner output with a 10pF capacitor in series. Excessive marker injection will distort the response curve.

Apply AGC bias to the terminal T of the printed circuit board TNP 1122-21. Set the channel selector switch to UHF 21~69 and adjust the channel selector to Channel 49.

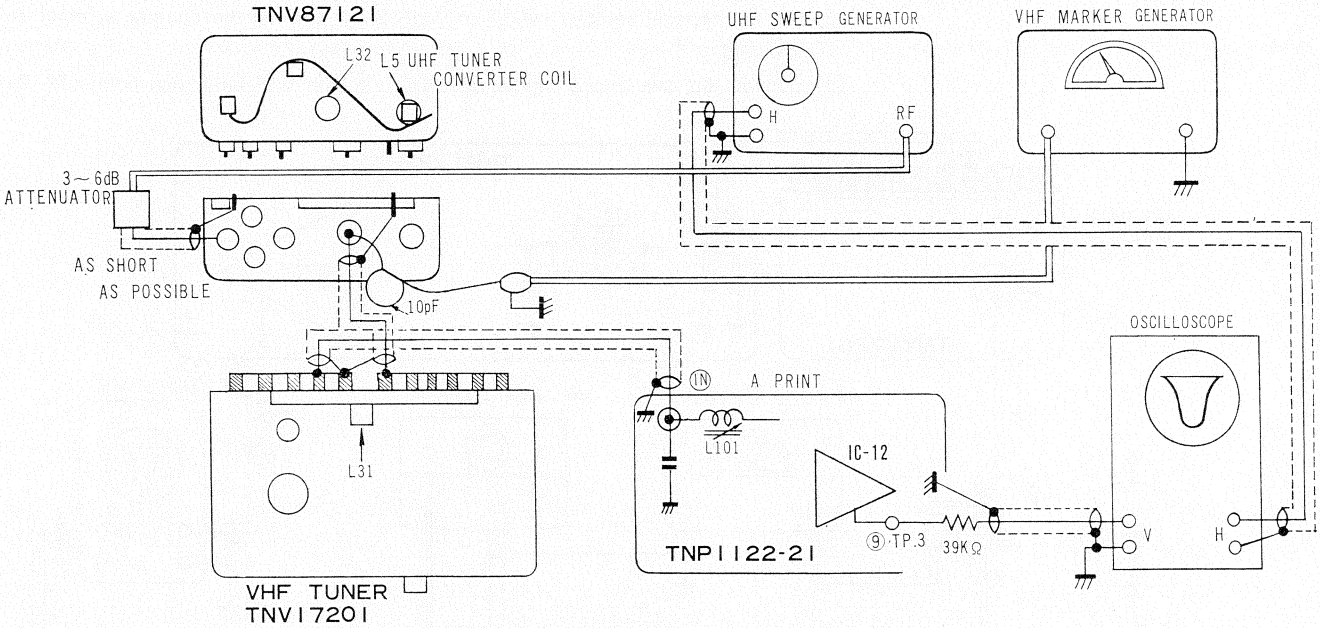


Fig. 4-3 TEST EQUIPMENT CONNECTION

(II) ADJUSTMENTS

(1) Set AGC bias to 1.2Volts.

(2) Set the center frequency of the sweep generator to 700 MHz.

(3) Adjust the channel selector to obtain the response curve.

(4) Adjust the sweep output level to obtain about 300mV p-p on the response.

(5) Adjust both L31 (VHF tuner IF coil) and L32 (UHF tuner converter coil) to obtain the correct response curve as shown in Fig. 4-4.

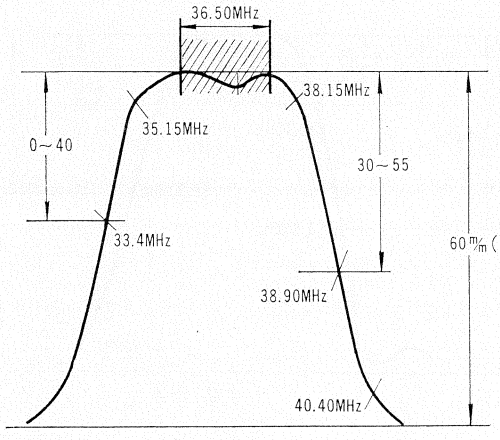


Fig. 4-4

SIF ADJUSTMENT

※ Disconnect R154 and C155.

Oscilloscope ····· Disconnect the blue lead attached to the M-mark foil on the printed circuit board TNP 1122-21 and connect it to the vertical shaft of the oscilloscope.
Turn the knob to max.

Sweep marker ····· Connect the sweep output to the terminal ⑦ of IC12.

Adjustment····· Confirm "S" curve is max. (Adjustment Coil : L201, L202, L203)

AFC ADJUSTMENT

(1) Turn the TV on.
(2) Disconnect the junction of R403 (47K) and C405.
(3) While watching the screen, turn VR41 (2KB) until the picture appears normal. (VR52 and H. Hold knob may be at any position.)
(4) Connect R403 (47K) and C405.
(5) Turn VR52 and H. Hold knob to see that there is always proper synchronization.

AVR

(1) Turn the TV on.
(2) Connect a Voltmeter across the terminal Ⓦ of the printed circuit board TNP 1122-21 and the ground.
(3) Turn VR56 to regulate voltage (4V).

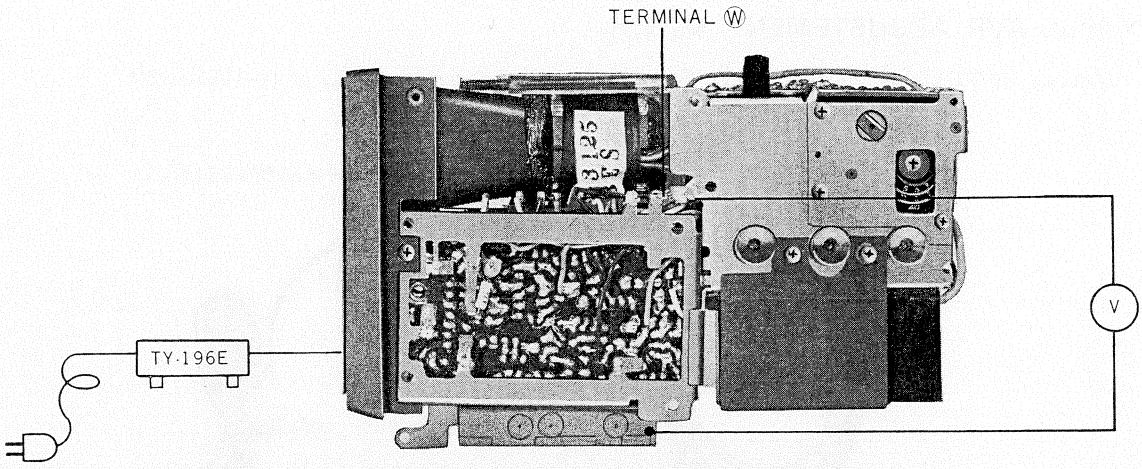


Fig. 4-5 TEST EQUIPMENT CONNECTION

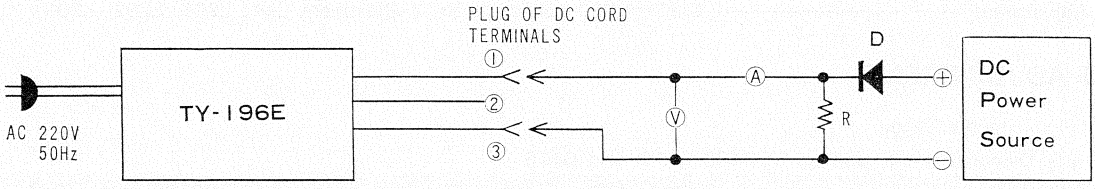
TY-196E AUTOMATIC OVERCHARGE PROTECTOR ALIGNMENT (Fig. 4-6, 4-7)

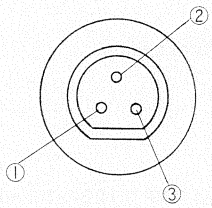
(1) Set the DC power source voltage to 5.9V under 25°C circumstance temprature and set to 6.0V under 20°C(External units)

(2) Turn the VR72 of TY-196E clockwise all the way.

(3) Set the selector of TY-196E to CHARGE.

(4) Turn VR72 counterclockwise to a point where Ⓐ suddenly drops to 0 and the pilot lamp goes off.





TSX174-1
PLUG OF DC CORD
(FRONT)

R = 3～5Ω
Ⓥ VOLTAGE METER 10～15V
Ⓐ DC AMMETER 300mA～1A
D=DIODE(IF＞10A)

Fig. 4-6

TY-196E AVR ADJUSTEMENT (Fig. 4-7)

Actuate TR-001EU by TY-196E and adjust VR71 until the DC output voltage of TY-196E is 5V.

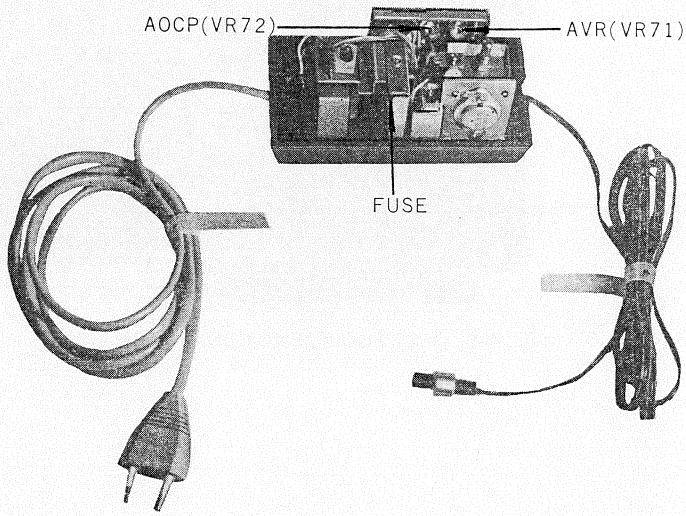


Fig. 4-7 TEST EQUIPMENT CONNECTION

5. WIRING DIAGRAM

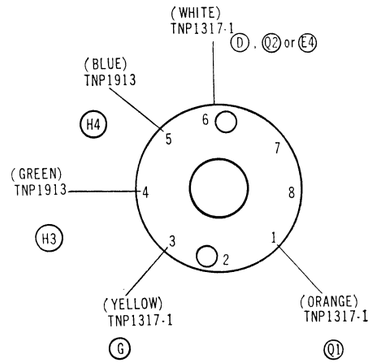


Fig. 5-1 PICTURE TUBE SOCKET

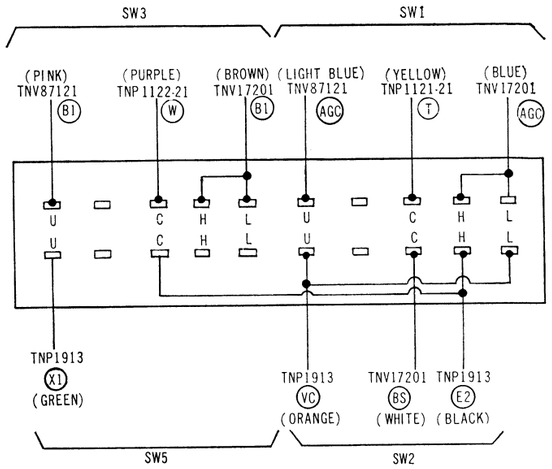


Fig. 5-2 CHANNEL SELECTOR SWITCH (BOTTOM VIEW)

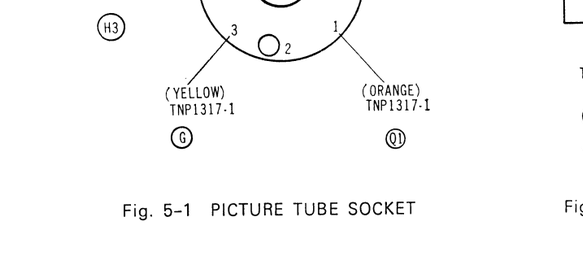


Fig. 5-3 TUNING VOLUME (REAR VIEW)

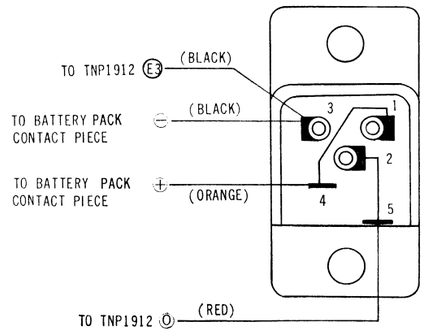


Fig. 5-4 3P POWER SOCKET (REAR VIEW)

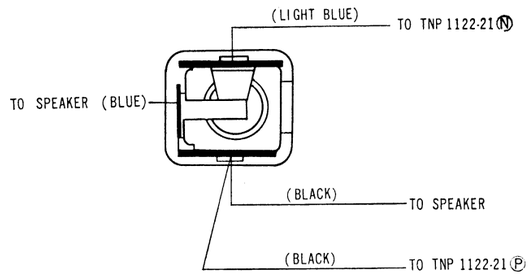


Fig. 5-5 EARPHONE SOCKET (REAR VIEW)

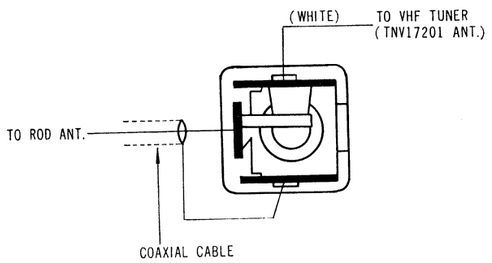


Fig. 5-6 ANTENNA SOCKET (REAR VIEW)

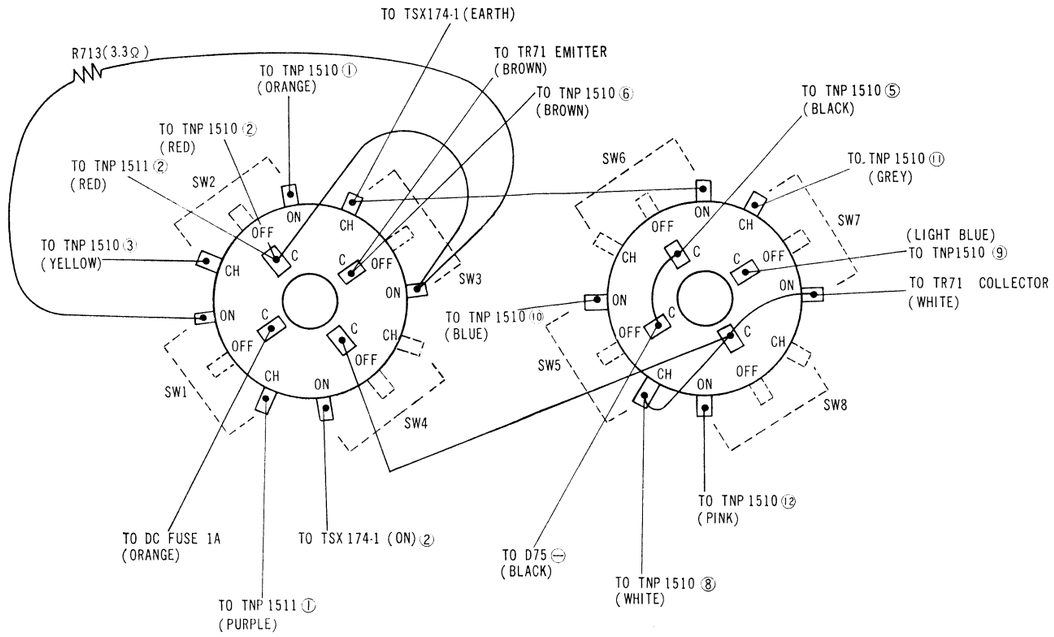


Fig. 5-7 AC ADAPTOR ROTARY SWITCH

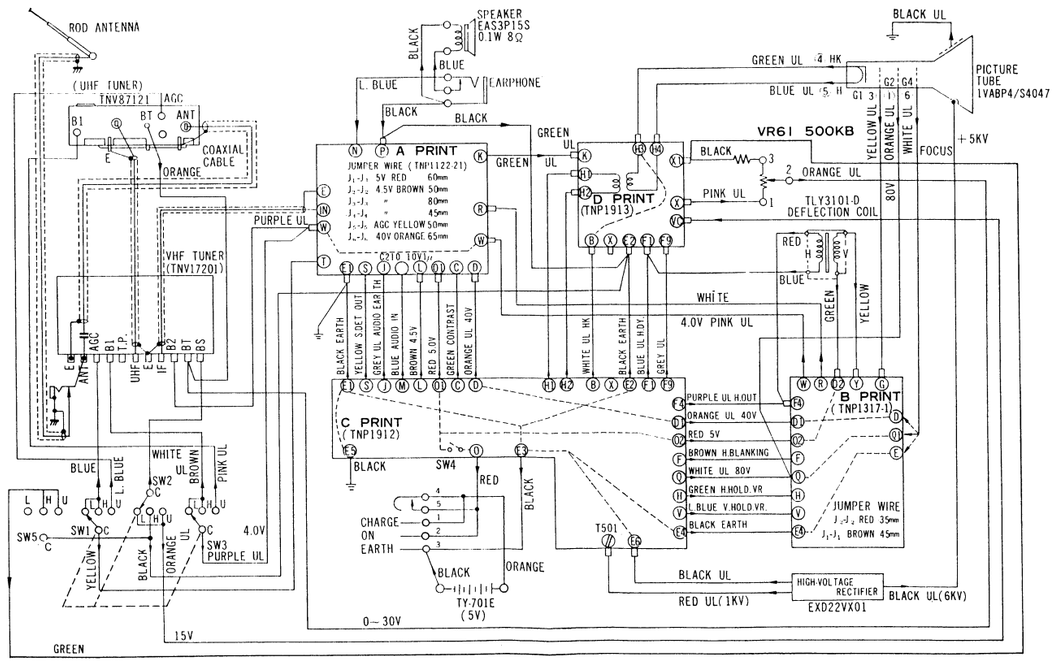


Fig. 5-8

6. BLOCK DIAGRAM

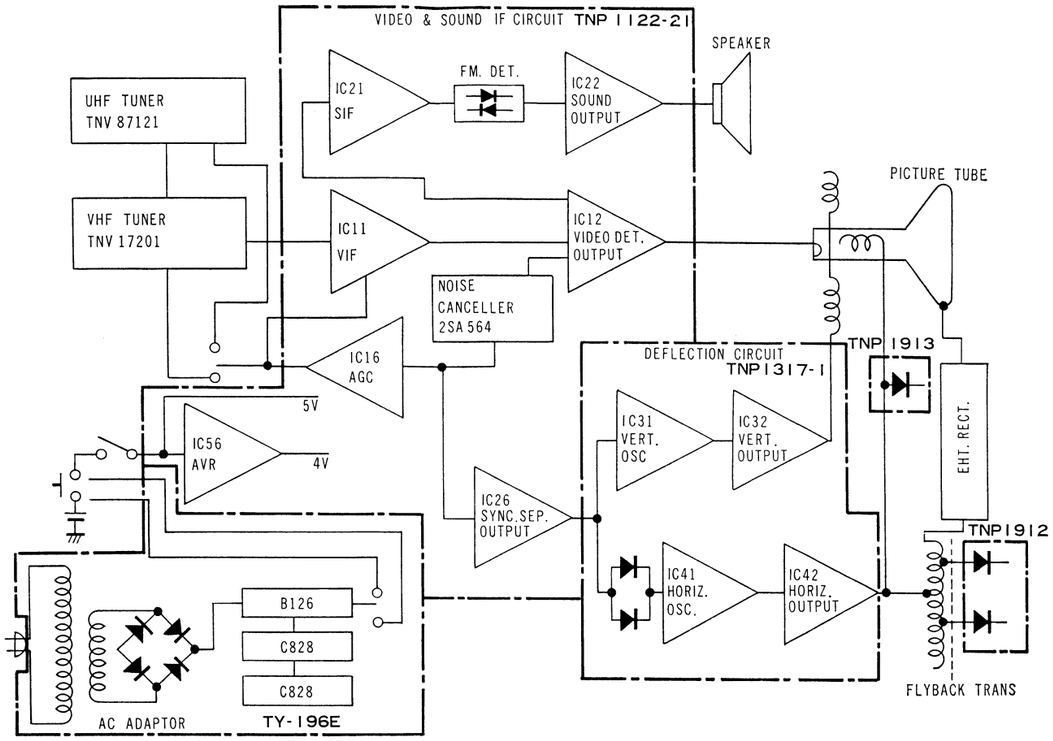
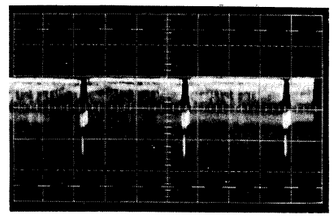
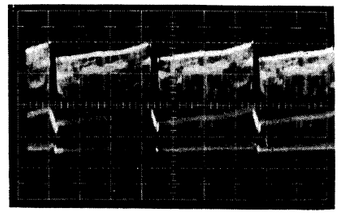


Fig. 6-1

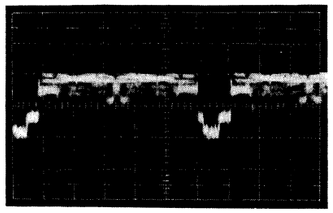
7. WAVE FORMS



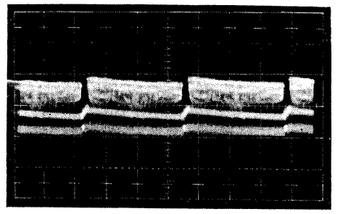
0.25V p-p ① VIDEO OUTPUT IC 12 TERMINAL ⑨



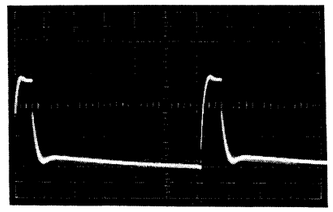
35V p-p ② VIDEO OUTPUT IC 12 TERMINAL ⑪



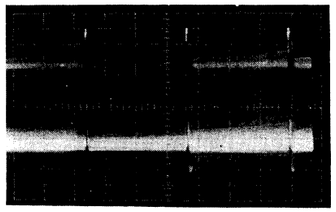
HORIZ. RATE 0.2V p-p ③ SYNC. SEP. AMP. IC 26 TERMINAL ①



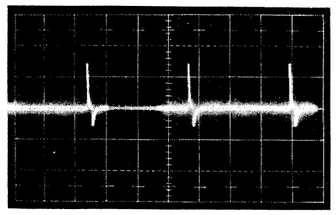
VERT. RATE 0.2V p-p ③ SYNC. SEP. AMP. IC 26 TERMINAL ①



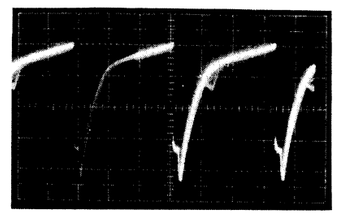
HORIZ. RATE 3.0V p-p ④ SYNC. AMP. TERMINAL ®



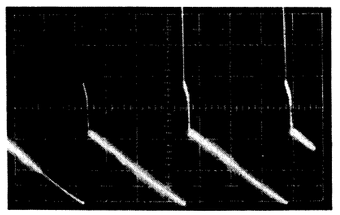
VERT. RATE 3V p-p ④ SYNC. AMP. TERMINAL ®



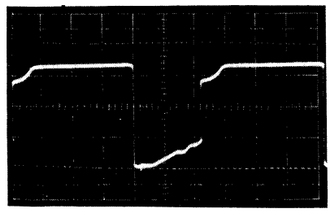
2V p-p ⑤ VERT. OSC. IC 31 TERMINAL ②



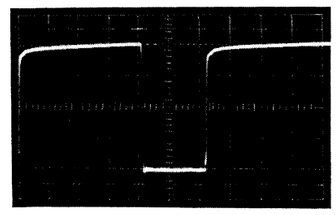
0.88V p-p ⑥ VERT. OUTPUT IC 32 TERMINAL ②



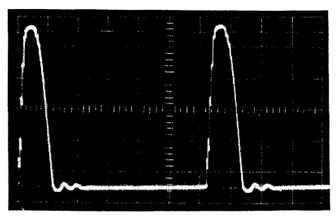
6.6V p-p ⑦ VERT. OUTPUT TERMINAL Ⓨ



1.7V p-p ⑧ HORIZ. OSC. IC 41 TERMINAL ②



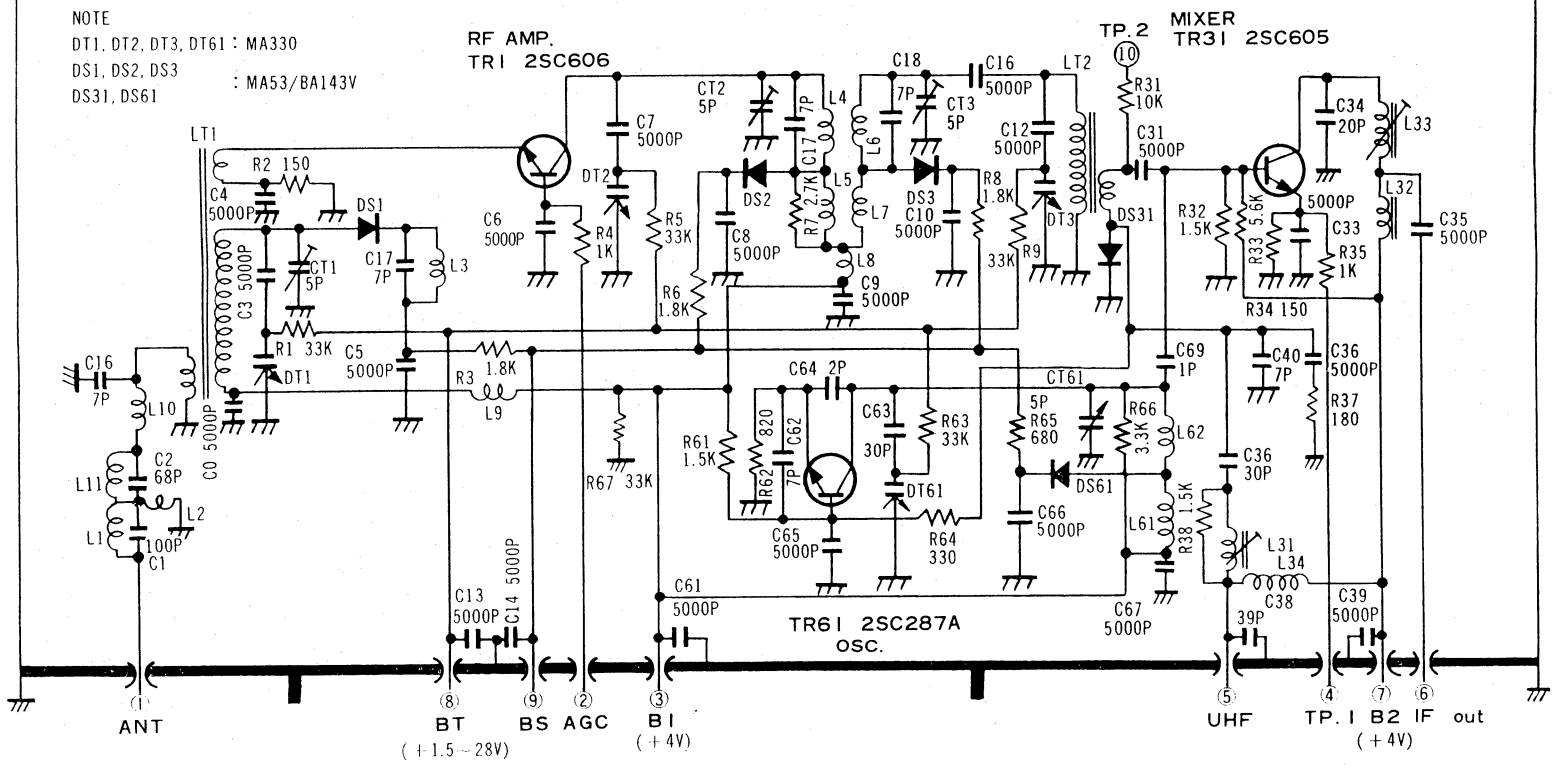
2V p-p ⑨ HORIZ. OSC. IC 41 TERMINAL ⑨



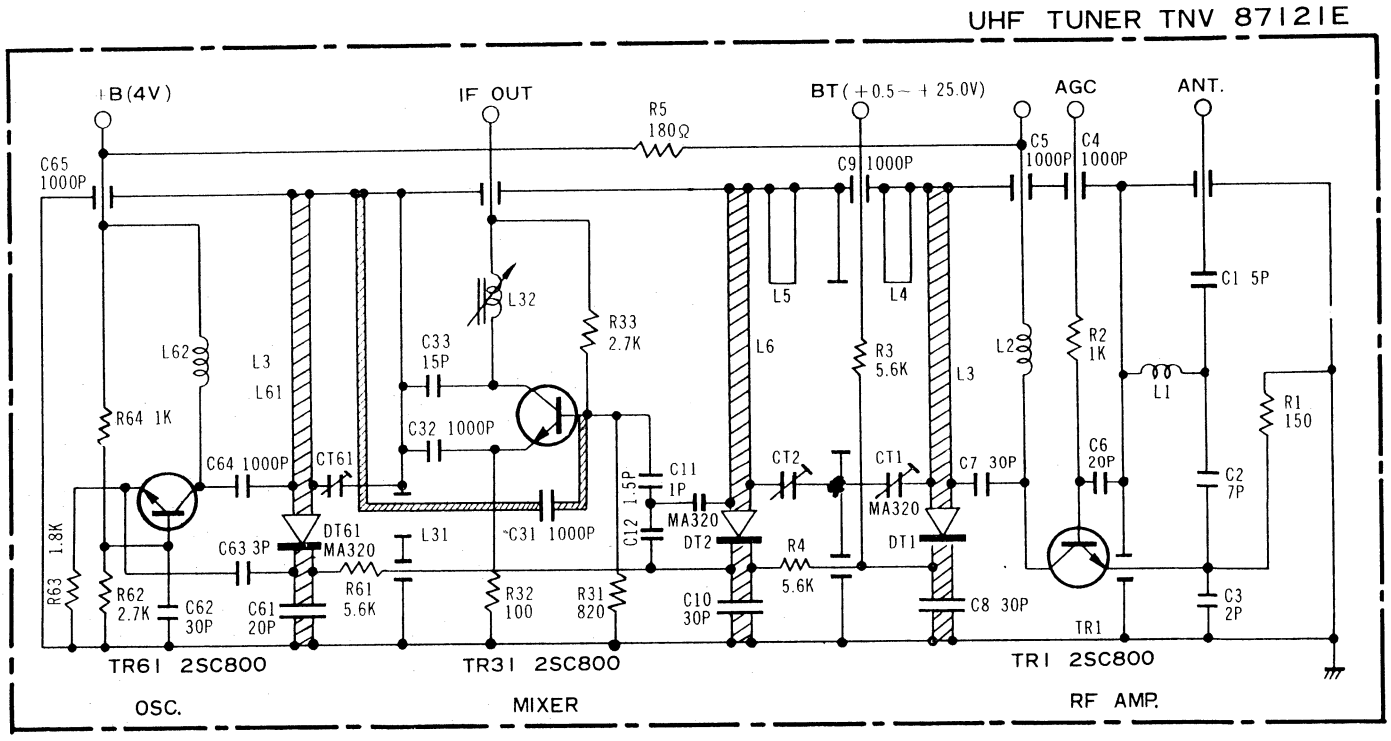
54V p-p ⑩ HORIZ. OUTPUT IC 42 TERMINAL ③

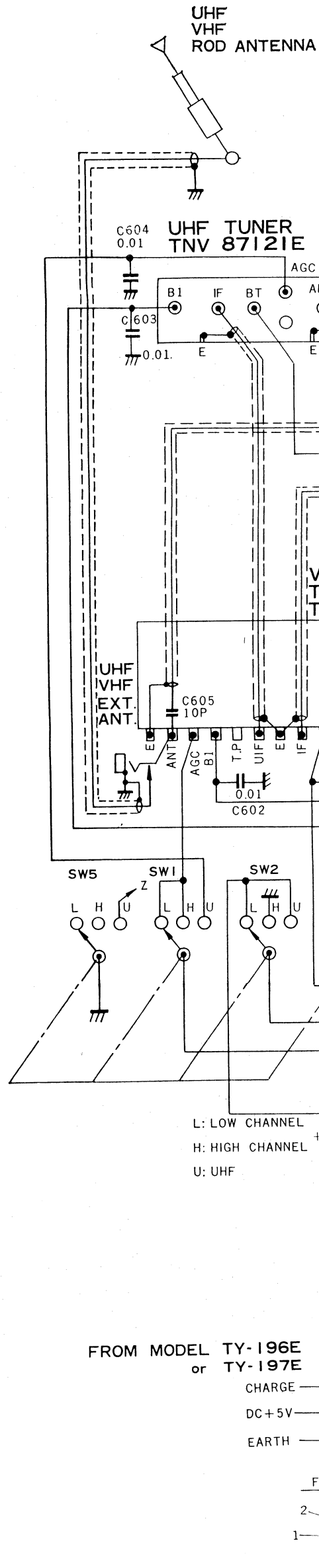
SCHEMATIC DIAGRAM OF MODEL TR-001EU

VHF TUNER TNV 17201E



UHF TUNER TNV 87121E





NOTE:
1. RESISTANCE VALUES ARE SHOWN IN OHMS: K=1000. M=1.000.000.
2. CAPACITANCE VALUES ARE SHOWN IN μF=10^{6}F OTHERWISE NOTED P=$\mu\mu$F=10^{-12}F.
3. COIL RESISTANCE VALUES LESS THAN 1 OHM ARE NOT SHOWN.
4. DC VOLTAGES ARE READ WITH VACUUM TUBE VOLT METER AND ALL CONTROLS SET FOR NORMAL PICTURE.
5. ALL WAVEFORMS ARE PEAK TO PEAK VOLTAGES WHEN VIDEO INPUT ① IS SET TO 0.25p-p AND CONTRAST, BRIGHTNESS CONTROLS ARE SET FOR MAXIMUM.
6. MARKS —O—O— INDICATE JUNCTION POINT FOR TERMINAL OF THE CIRCUIT BOARDS.
7. THE NUMBER ①, ②,…SHOWN ON SCHEMATIC DIAGRAM INDICATE POINTS OF OBSERVATION OF THE WAVEFORMS.

UHF
VHF
ROD ANTENNA

UHF TUNER
TNV 87121E

VHF
TUNER
TNV 17201

L: LOW CHANNEL
H: HIGH CHANNEL
U: UHF

MODEL TY-196E
or TY-197E
CHARGE
DC+5V
EARTH
TY-701E

TNP 1122-21

IC21
EHD AR051
(SOUND IF AMP.)

IC11
EHD AR048
(VIDEO IF AMP.)

IC12
EHD AW049
(VIDEO DET.OUTPUT)

IC26
EHD HA053
(SYNC. SEP. AMP.)

IC31
EHD SN054
(VERT. OSC)

IC32
EHD AP055
(VERT. OUTPUT)

IC56
EHD RD058
(A.V.R)

IC41
EHD SN056
(HORIZ.OSC.)

IC42
EHD AP057
(HORIZ. OUTPUT)

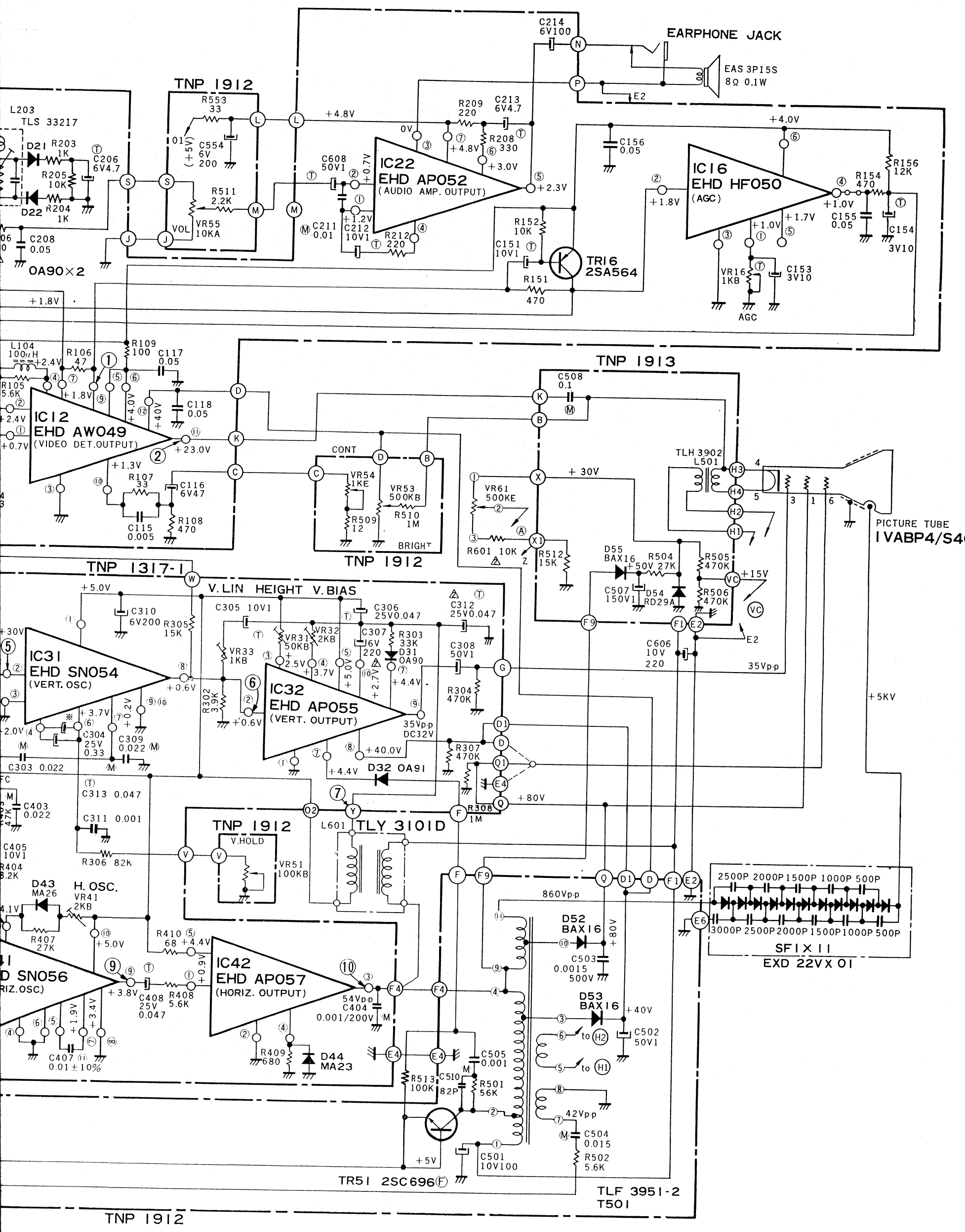
TNP 1912

TNP 1317-1

TNP 1912

TNP 1912

TR51 2


TNP 1912
L203
TLS 33217
D21
D22
R203 1K
R204 1K
R205 10K
C206 6V4.7
C208 0.05
0A90×2
R553 33
C554 6V 200
R511 2.2K
VR55 10KA
VOL
C608 50V1
C211 0.01
C212 10V1
R212 220
+4.8V
0V
+0.7V
+1.2V
IC22
EHD AP052
(AUDIO AMP. OUTPUT)
+2.3V
R209 220
C213 6V4.7
R208 330
+4.8V
+3.0V
C214 6V100
EARPHONE JACK
EAS 3P15S
8Ω 0.1W
E2
C156 0.05
+4.0V
+1.8V
IC16
EHD HF050
(AGC)
+1.0V
+1.7V
R154 470
R156 12K
C155 0.05
C154 3V10
VR16 1KB
C153 3V10
AGC
R152 10K
C151 10V1
R151 470
TR16 2SA564
+1.8V
L104 100μH
R106 47
R109 100
C117 0.05
C118 0.05
R105 5.6K
+2.4V
+0.7V
+1.8V
+4.0V
+23.0V
+1.3V
R107 33
C116 6V47
C115 0.005
R108 470
IC12
EHD AW049
(VIDEO DET.OUTPUT)
TNP 1913
C508 0.1
CONT
VR54 1KE
VR53 500KB
R509 12
R510 1M
BRIGHT
TNP 1912
VR61 500KE
R601 10K
R512 15K
+30V
TLH 3902
L501
PICTURE TUBE
1VABP4/S4047
D55 BAX16
R504 50V 27K
C507 150V1
D54 RD29A
R505 470K
R506 470K
+15V
C606 10V 220
35Vp-p
E2
TNP 1317-1
V. LIN HEIGHT V. BIAS
+5.0V
C310 6V200
R305 15K
C305 10V1
VR31 50KB
VR32 2KB
VR33 1KB
C306 25V0.047
C307 6V 220
R303 33K
D31 0A90
C312 25V0.047
C308 50V1
R304 470K
R302 3.9K
IC31
EHD SN054
(VERT. OSC)
+0.6V
+3.7V
+0.2V
C304 25V 0.33
C309 0.022
C303 0.022
IC32
EHD AP055
(VERT. OUTPUT)
35Vp-p
DC32V
+40.0V
+4.4V
D32 0A91
R307 470K
+80V
R308 1M
C313 0.047
C311 0.001
R306 82k
TNP 1912
V.HOLD
VR51 100KB
L601
TLY 3101D
+5KV
2500P 2000P 1500P 1000P 500P
3000P 2500P 2000P 1500P 1000P 500P
SF1X11
EXD 22VX01
860Vp-p
D52 BAX16
C503 0.0015 500V
D53 BAX16
+40V
C502 50V1
to H2
to H1
42Vp-p
C504 0.015
R502 5.6K
C501 10V100
+5V
TR51 2SC696F
TLF 3951-2
T501
D43 MA26
H. OSC.
VR41 2KB
R407 27K
R410 68
+4.4V
+5.0V
+0.9V
+3.8V
C408 25V 0.047
R408 5.6K
IC42
EHD AP057
(HORIZ. OUTPUT)
54Vp-p
C404 0.001/200V
R409 680
D44 MA23
C407 0.01±10%
R513 100K
C510 82P
R501 56K
C505 0.001
TNP 1912

9. CIRCUIT BOARDS OF MODEL TR-001EU

VIDEO & SOUND IF PRINTED CIRCUIT BOARD (TNP 1122-21)

CONMPONENT VIEW

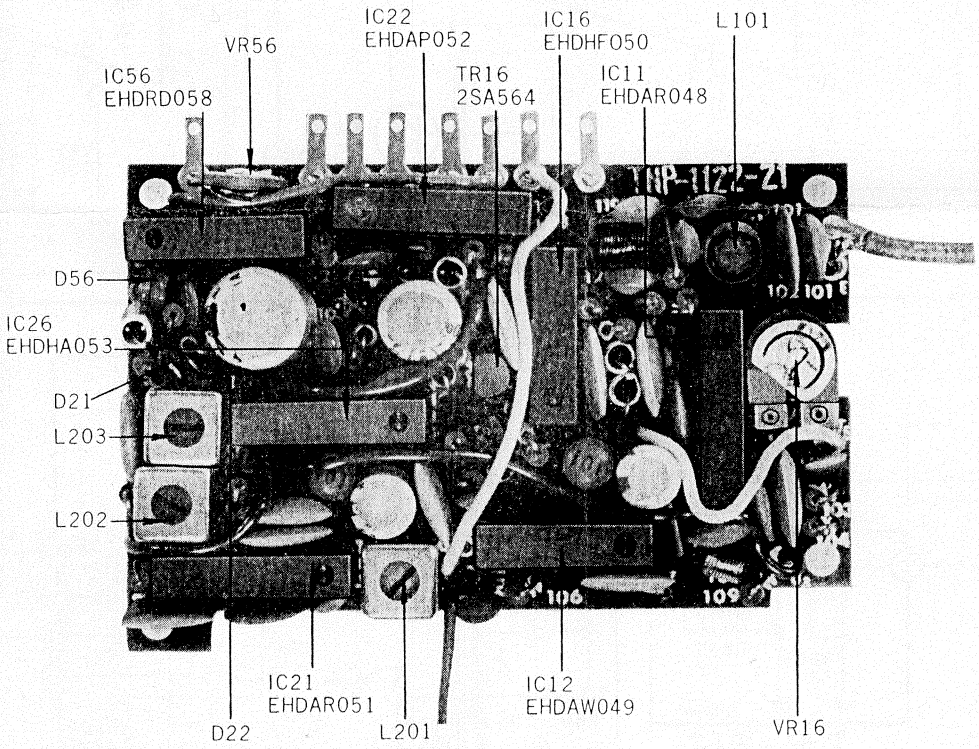


Fig. 9-1

CONDUCTOR VIEW

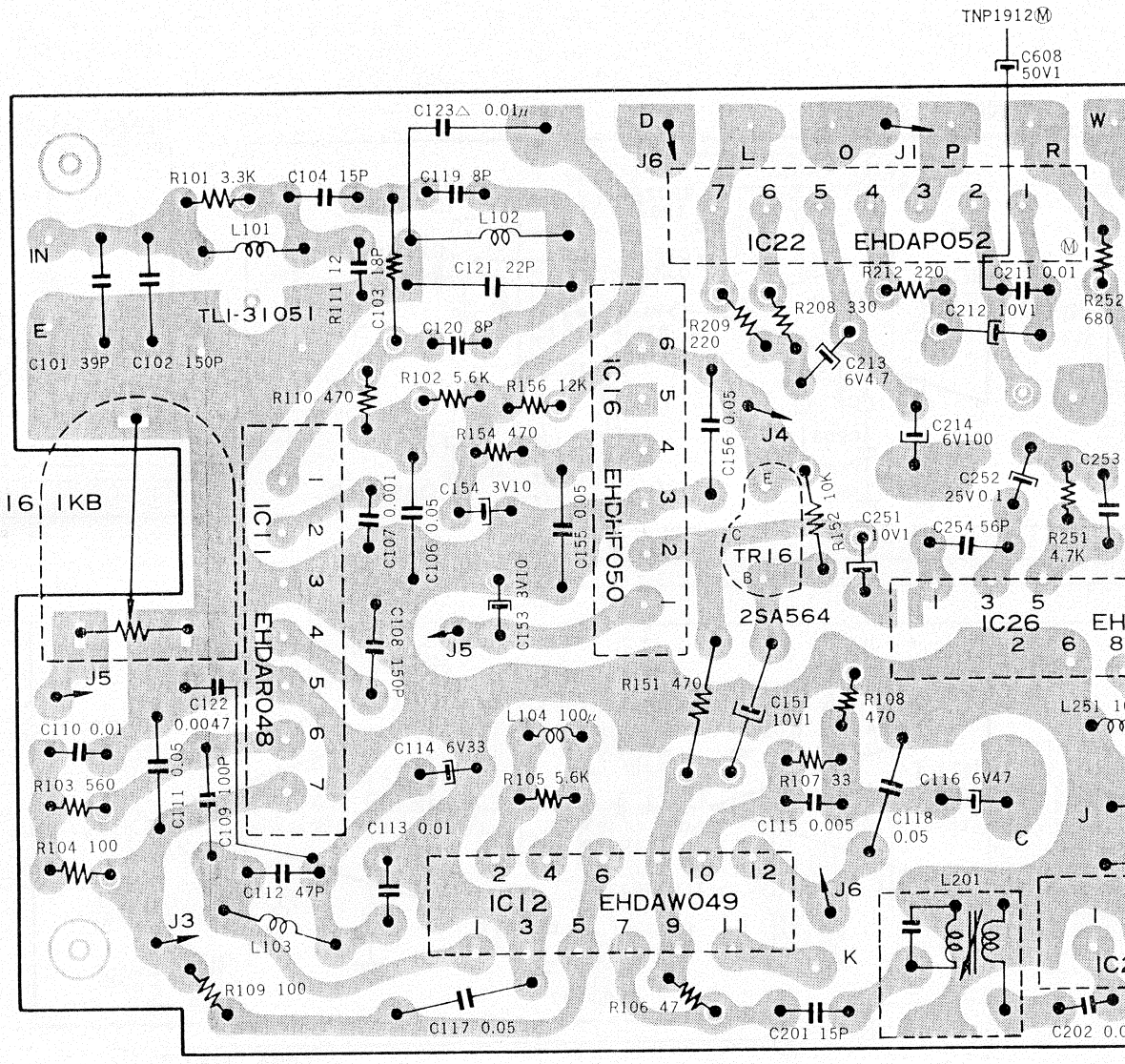


Fig. 9-2

OTHER PRINTED CIRCUIT BOARDS (TNP 1913)

CONMPONENT VIEW

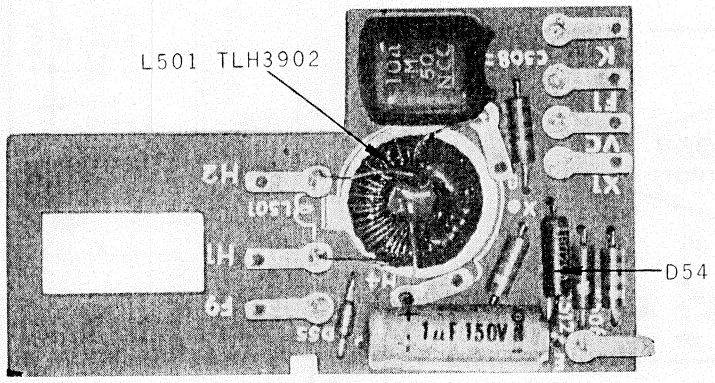


Fig. 9-5

CONDUCTOR VIEW

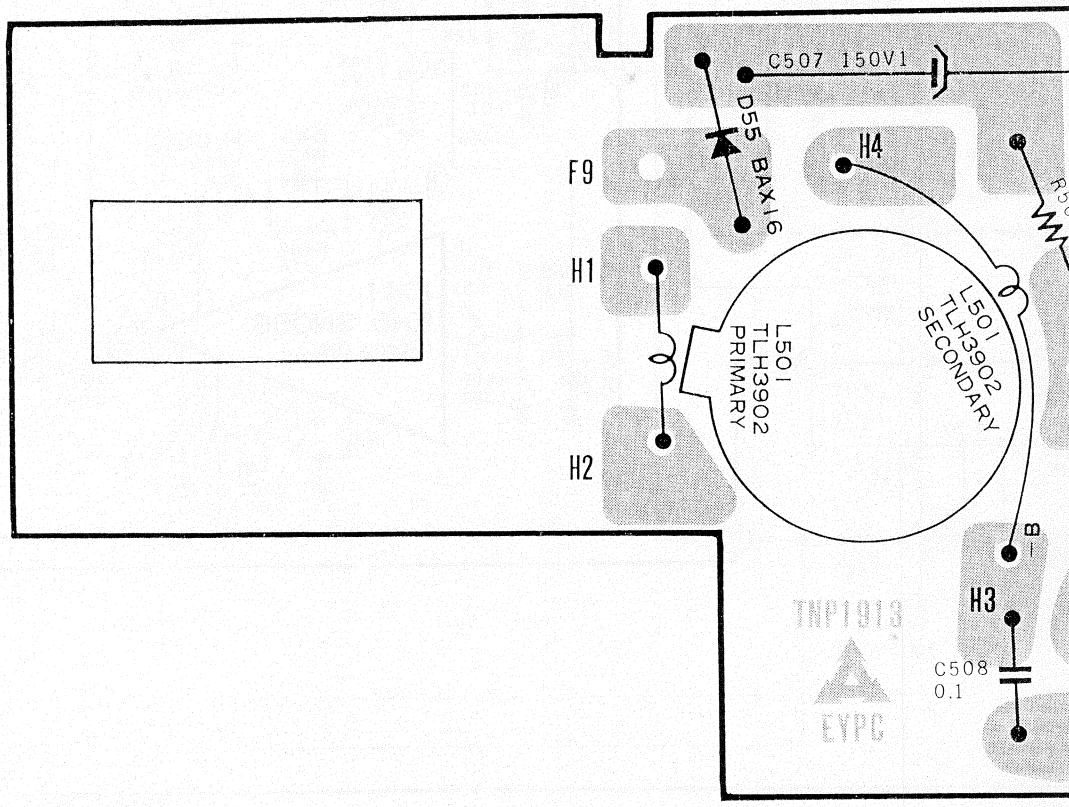


Fig. 9-6

CTOR VIEW

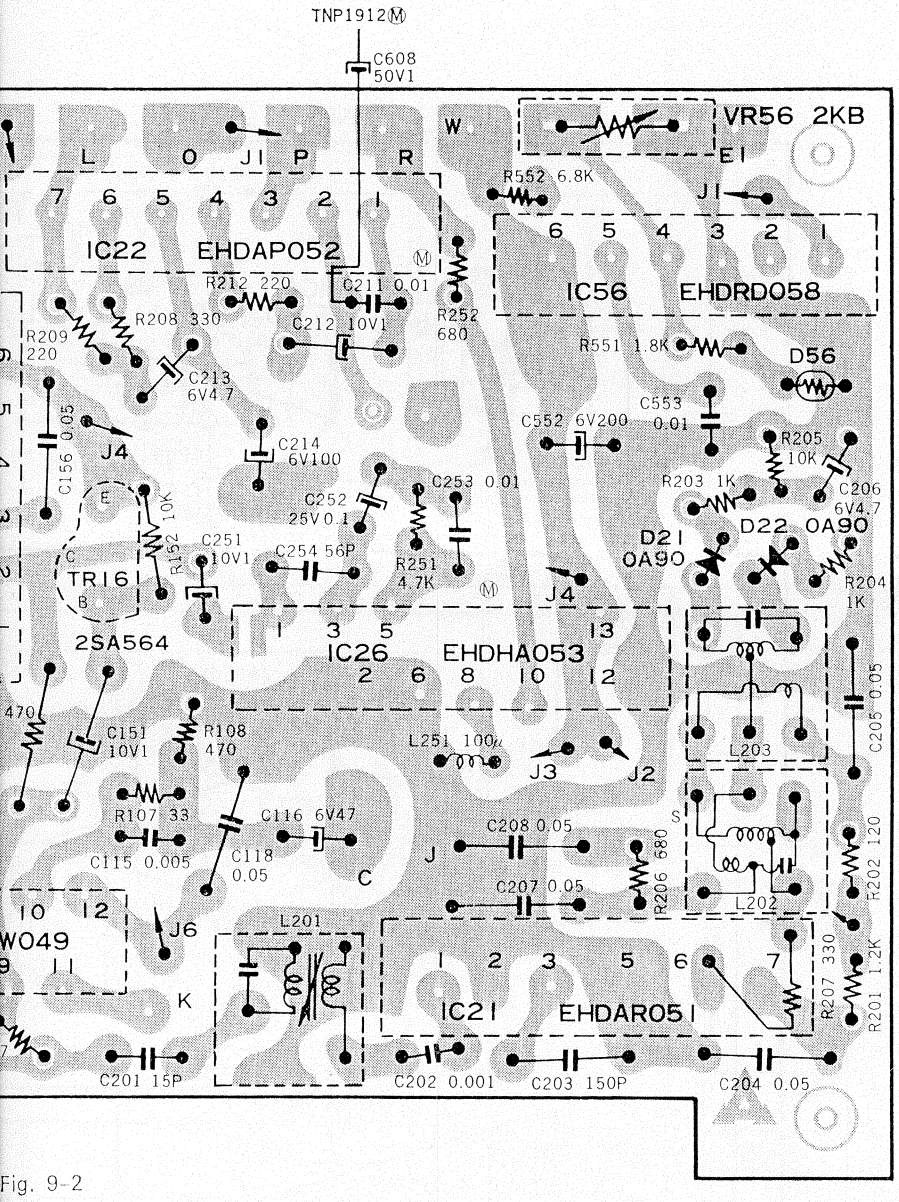


Fig. 9-2

CONMPONENT VIEW

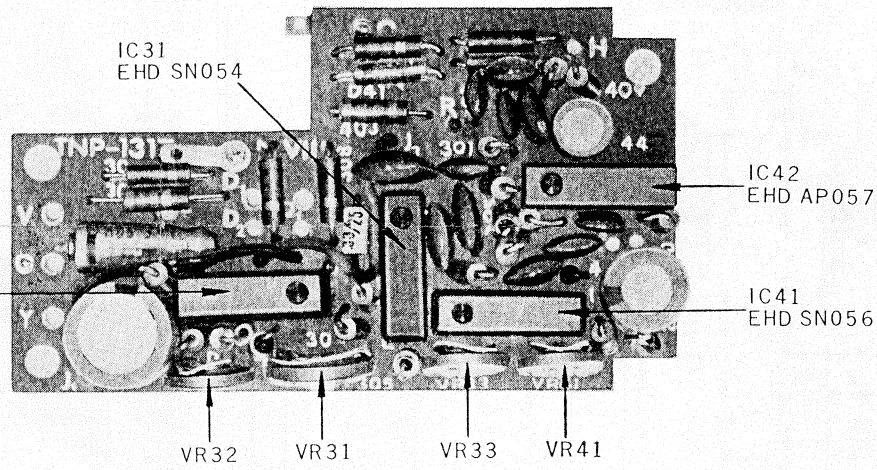
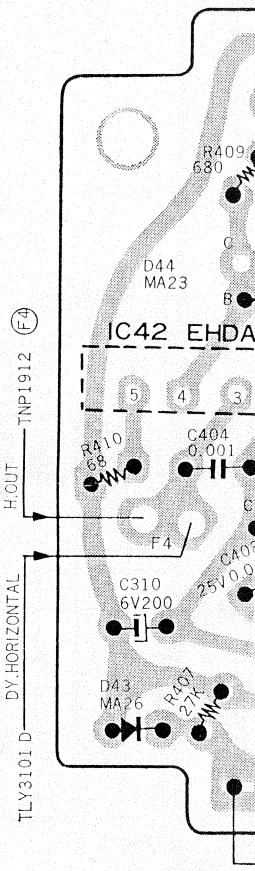
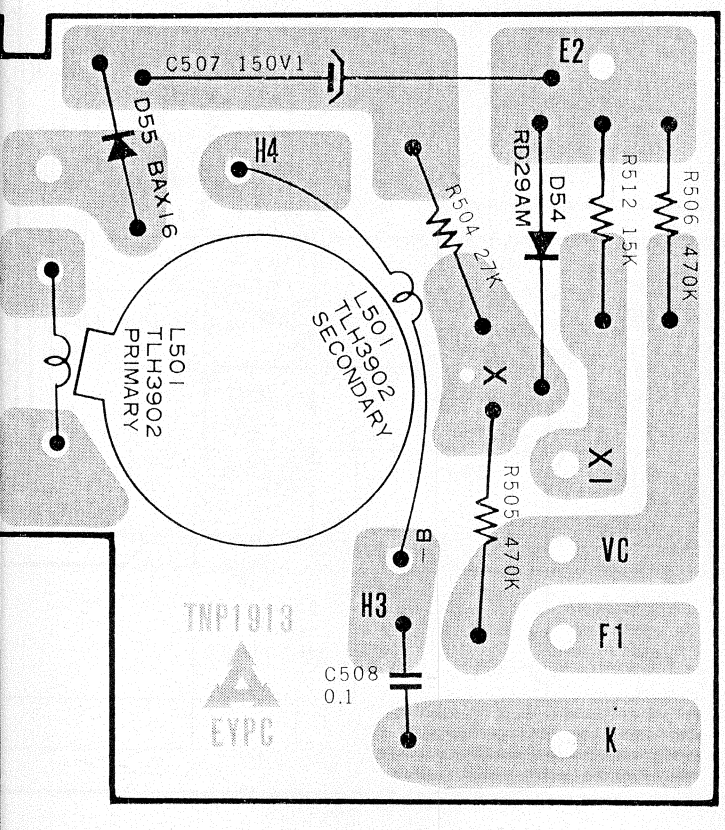


Fig. 9-3



(TNP 1912)

CTOR VIEW



g. 9-6

CONMPONENT VIEW

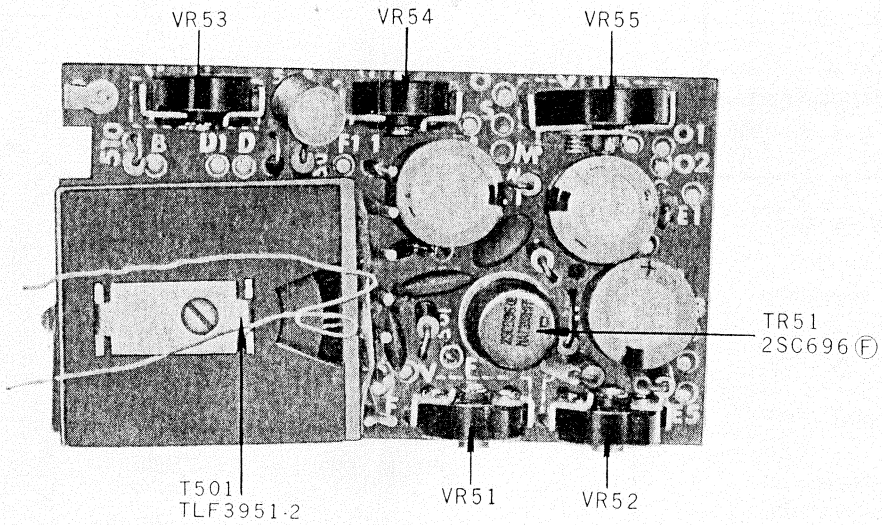
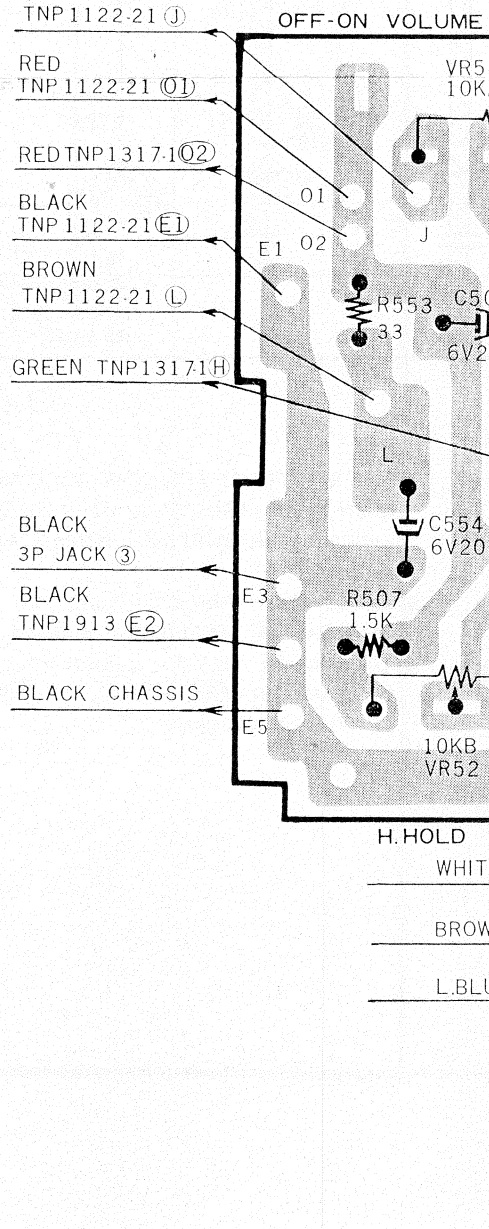


Fig. 9-7



DEFLECTION PRINTED CIRCUIT BOARD (TNP 1317-1)

CONDUCTOR VIEW

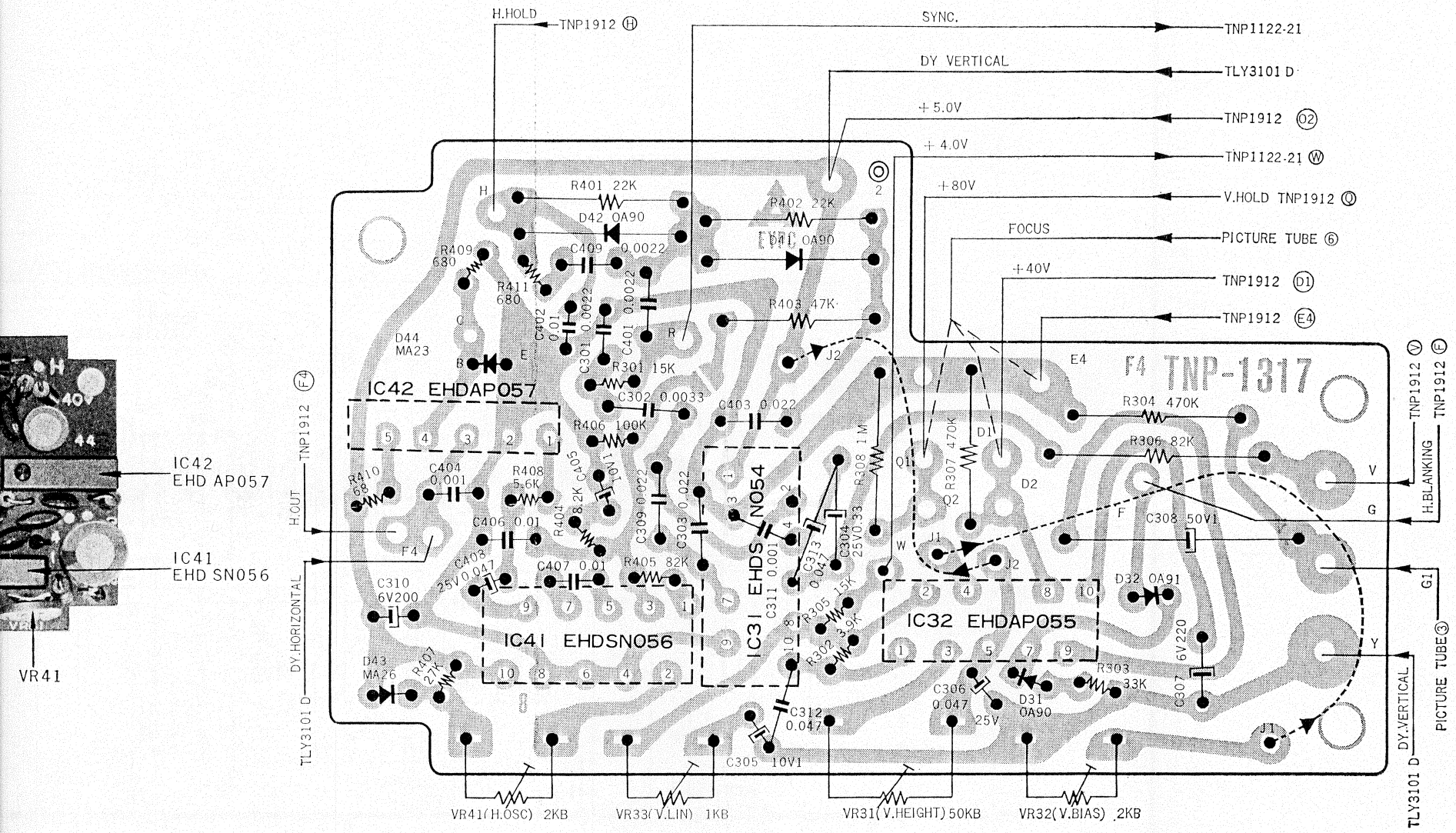


Fig. 9-4

(TNP 1912)

CONDUCTOR VIEW

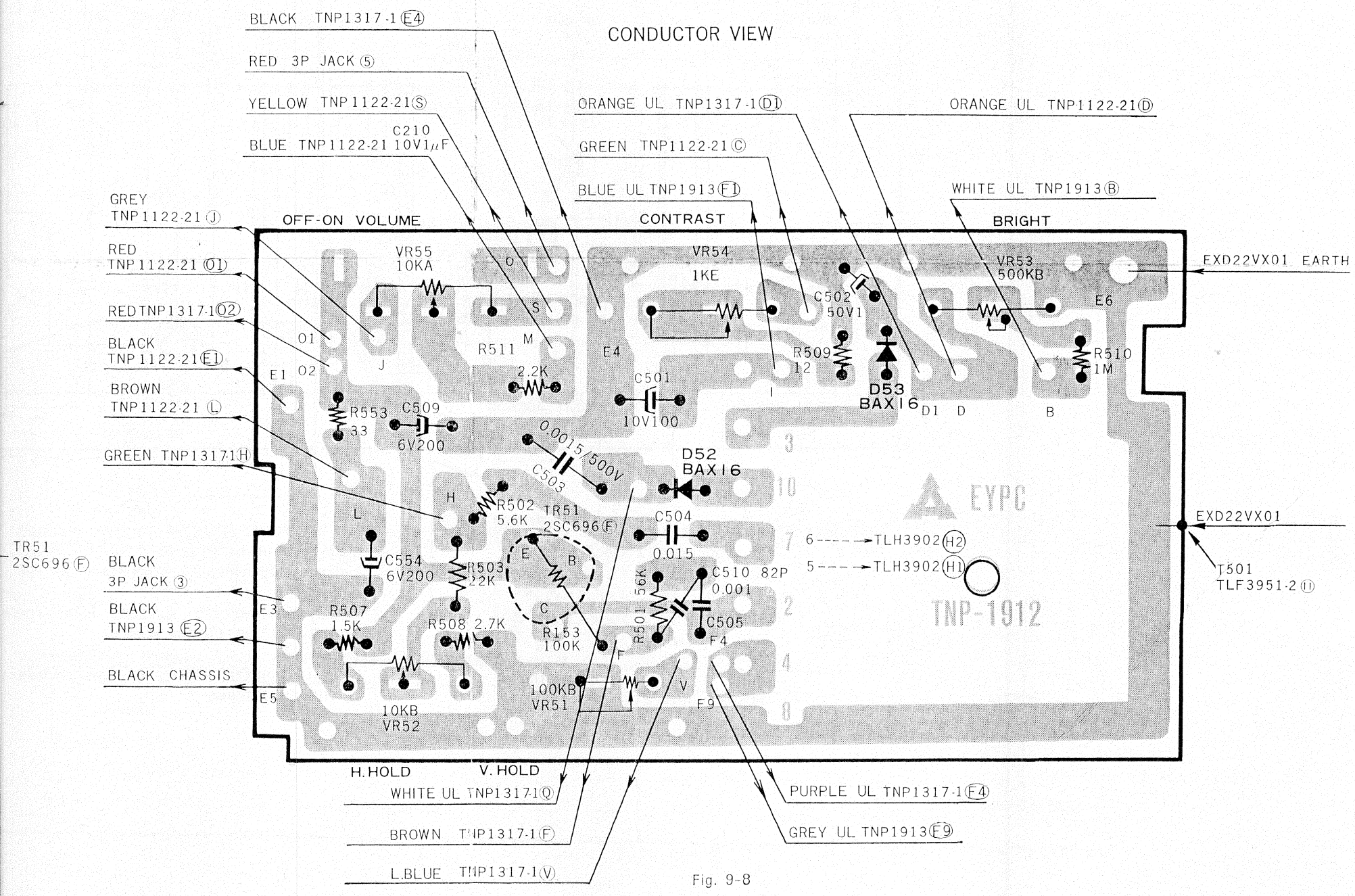
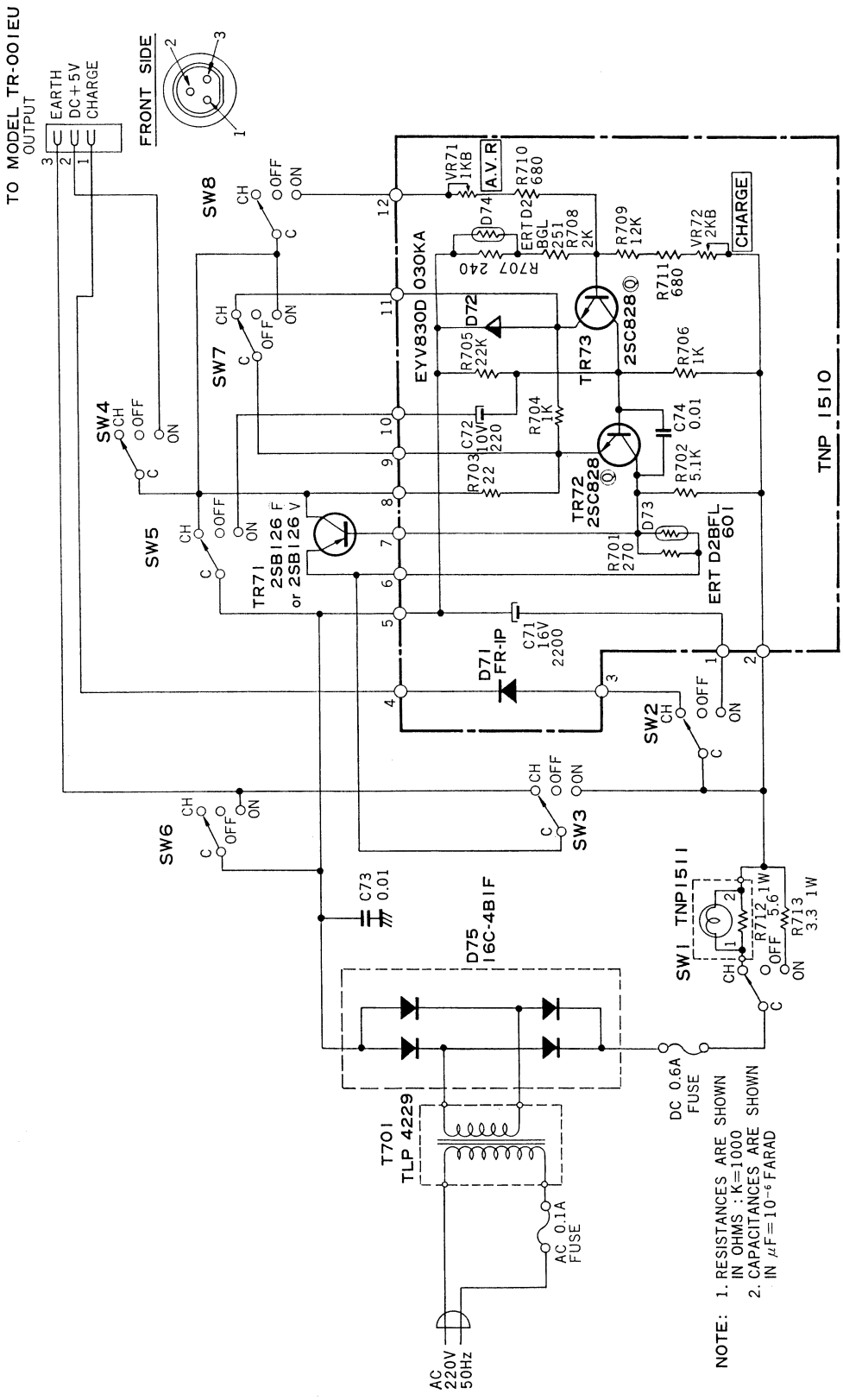


Fig. 9-8

SCHEMATIC DIAGRAM MODEL TY-196E



CIRCUIT BOARDS OF MODEL TY-196E

COMPONENT VIEW

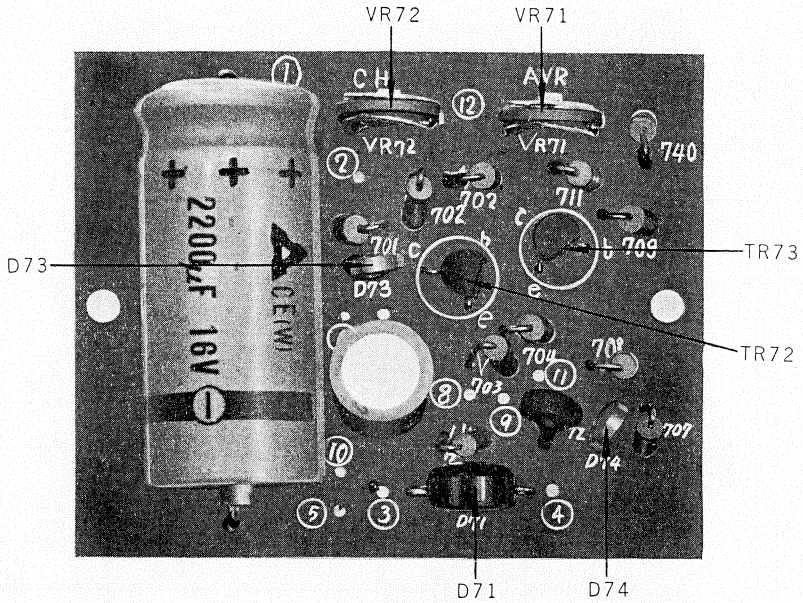


Fig. 9-9

TNP 1510

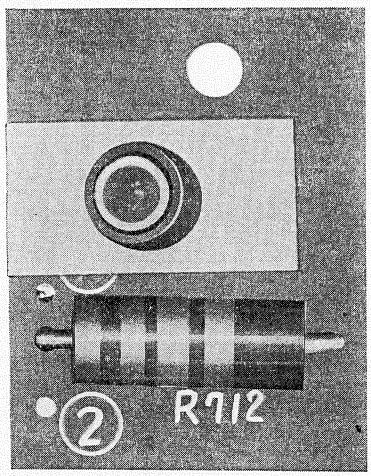


Fig. 9-10

TNP 1511

CONDUCTOR VIEW

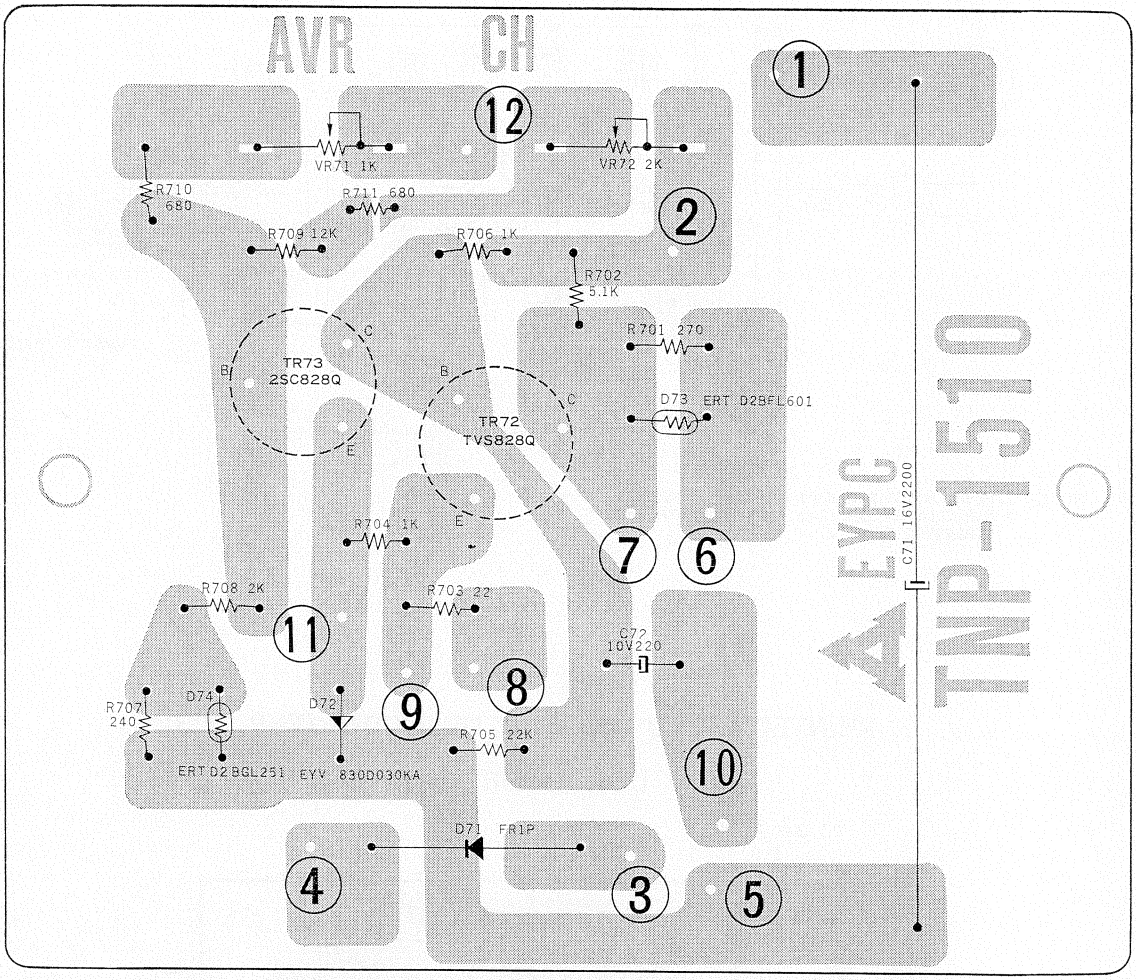


Fig. 9-11

AVR & AOCP PRINTED CIRCUIT BOARD (TNP 1510)

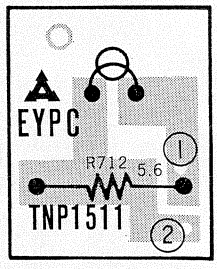
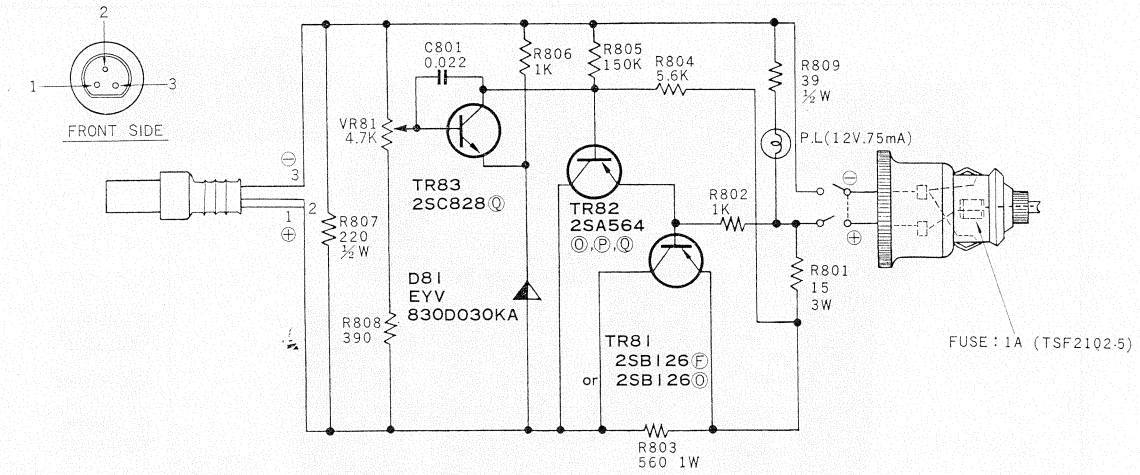


Fig. 9-12

PILOT LAMP PRINTED CIRCUIT BOARD (TNP 1511)

CONDUCTOR VIEW

SCHEMATIC DIAGRAM OF MODEL TY-197E



NOTE: 1. RESISTANCES ARE SHOWN IN OHMS : K=1000
2. CAPACITANCES ARE SHWON IN μF (10−6FARAD)
OTHERWISE NOTED : P= 10−12 FARAD

RRINTED CIRCUIT BOARD OF TY197E (TNP 1513)

CONDUTOR VIEW

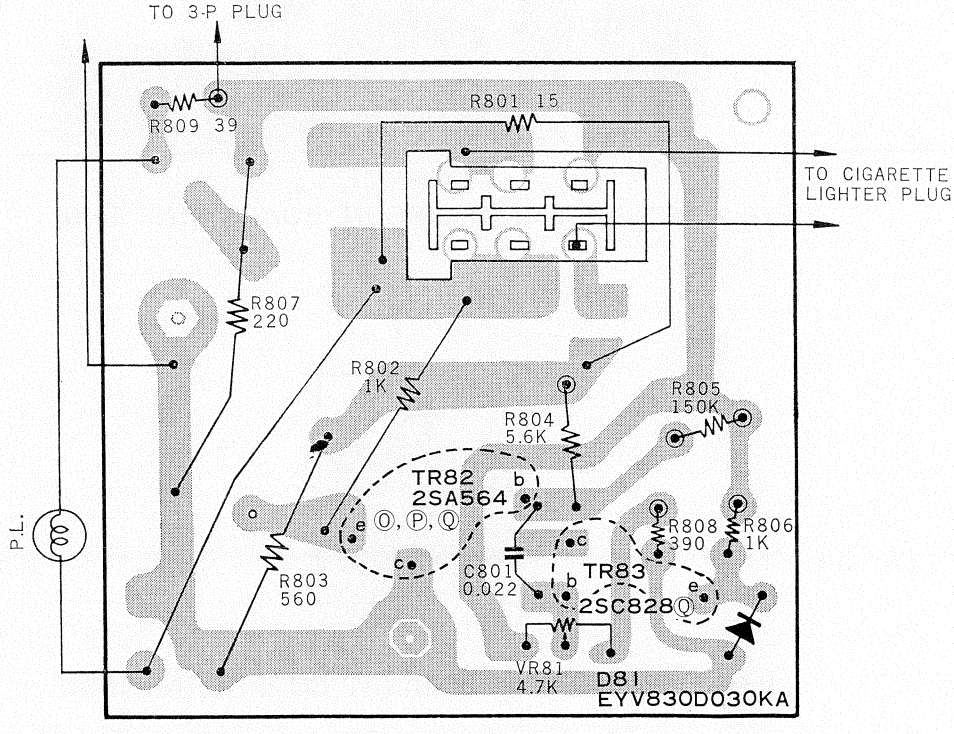


Fig. 9-13

10. REPLACEMENT PARTS LIST

SYMBOL	PART NO.	DESCRIPTION	
	RESISTORS		
R 101	ERC 16GK332	Solid, 3.3KΩ ±10%	¼W
R 102	ERC 16GK562	Solid, 5.6KΩ ±10%	¼W
R 103	ERC 16GK561	Solid, 560Ω ±10%	¼W
R 104	ERC 16GK101	Solid, 100Ω ±10%	¼W
R 105	ERC 16GK562	Solib, 5.6KΩ ±10%	¼W
R 106	ERC 16GK470	Solid, 47Ω ±10%	¼W
R 107	ERC 16GK330	Solid, 33Ω ±10%	¼W
R 108	ERC 16GK471	Solid, 470Ω ±10%	¼W
R 109	ERC 16GK101	Solid, 100Ω ±10%	¼W
R 110	ERC 16GK471	Solid, 470Ω ±10%	¼W
R 111	ERC 16GK120	Solid, 12Ω ±10%	¼W
R 151	ERC 16GK471	Solid, 470Ω ±10%	¼W
R 152	ERC 16GK103	Solid, 10KΩ ±10%	¼W
R 154	ERC 16GK471	Solid, 470Ω ±10%	¼W
R 156	ERC 16GK123	Solid, 12KΩ ±10%	¼W
R 201	ERC 16GK122	Solid, 1.2KΩ ±10%	¼W
R 202	ERC 16GK121	Solid, 120Ω ±10%	¼W
R 203	ERC 16GK102	Solid, 1KΩ ±10%	¼W
R 204	ERC 16GK102	Solid, 1KΩ ±10%	¼W
R 205	ERC 16GK103	Solid, 10KΩ ±10%	¼W
R 206	ERC 16GK681	Solid, 680Ω ±10%	¼W
R 207	ERC 16GK 331	Solid, 330Ω ±10%	¼W
R 208	ERC 16GK331	Solid, 330Ω ±10%	¼W
R 209	ERC 16GK221	Solid, 220Ω ±10%	¼W
R 212	ERC 16GK221	Solid, 220Ω ±10%	¼W
R 251	ERC 16GK472	Solid, 4.7KΩ ±10%	¼W
R 252	ERC 16GK681	Solid, 680KΩ ±10%	¼W
R 301	ERC 16GK153	Solid, 15KΩ ±10%	¼W
R 302	ERC 16GK392	Solid, 3.9KΩ ±10%	¼W
R 303	ERC 16GK333	Solid, 33KΩ ±10%	¼W
R 304	ERC 16GK474	Solid, 470KΩ ±10%	¼W
R 305	ERC 16GK153	Solid, 15KΩ ±10%	¼W
R 306	ERC 16GK823	Solid, 82KΩ ±10%	¼W
R 307	ERC 16GK474	Solid, 470KΩ ±10%	¼W
R 308	ERC 16GK105	Solid, 1MΩ ±10%	¼W
R 401	ERC 16GK223	Solid, 22KΩ ±10%	¼W
R 402	ERC 16GK223	Solid, 22KΩ ±10%	¼W
R 403	ERC 16GK473	Solid, 47KΩ ±10%	¼W
R 404	ERC 16GK822	Solid, 8.2KΩ ±10%	¼W
R 405	ERC 16GK823	Solid, 82KΩ ±10%	¼W
R 406	ERC 16GK104	Solid, 100KΩ ±10%	¼W
R 407	ERC 16GK273	Solid, 27KΩ ±10%	¼W
R 408	ERC 16GK562	Solid, 5.6KΩ ±10%	¼W
R 409	ERC 16GK681	Solid, 680Ω ±10%	¼W
R 410	ERC 16GK680	Solid, 68Ω ±10%	¼W
R 411	ERC 16GK681	Solid, 680Ω ±10%	¼W
R 501	ERC 16GK563	Solid, 56KΩ ±10%	¼W
R 502	ERC 16GK562	Solid, 5.6K ±10%	¼W
R 503	ERC 16GK223	Solid, 22K ±10%	¼W
R 504	ERC 16GK273	Solid, 27KΩ ±10%	¼W
R 505	ERC 16GK474	Solid, 470KΩ ±10%	¼W
R 506	ERC 16GK474	Solid, 470KΩ ±10%	¼W
R 507	ERC 16GK152	Solid, 1.5KΩ ±10%	¼W
R 508	ERC 16GK272	Solid, 2.7KΩ ±10%	¼W
R 509	ERC 16GK120	Solid, 12Ω ±10%	¼W
R 510	ERC 16GK105	Solid, 1MΩ ±10%	¼W
R 511	ERC 16GK222	Solid, 22KΩ ±10%	¼W
R 512	ERC 16GK153	Solid, 15KΩ ±10%	¼W
R 513	ERC 16GK104	Solid, 100KΩ ±10%	¼W
R 551	ERC 16GK182	Solid, 1.8KΩ ±10%	¼W
R 552	ERC 16GK682	Solid, 6.8KΩ ±10%	¼W
R 553	ERC 16GK330	Solid, 33Ω ±10%	¼W
R 601	ERC 12GJ 103	Solid, 10KΩ ±5%	½W
	VARIABLE RESISTORS		
VR 16	TVZ S3AA00B13M	1KΩ, AGC Control	
VR 31	EVL T0AA00B54	50KΩ, Vert. Height	
VR 32	TVZ T0AA00B23M	2KΩ, Vert. Bias	
VR 33	TVZ T0AA00B13M	1KΩ, Vert. Linearity	
VR 41	TVZ T0AA00B23M	2KΩ, Horiz. Osc.	
VR 51	EVL 10AT10B15	100KΩ, Vert. Hold	
VR 52	EVL 10AT10B14	10KΩ, Horiz. Hold	
VR 53	EVL 10AT10B55	500KΩ, Brightness	
VR 54	EVL 08AT10E13	1KΩ, Contrast	
VR 55	EVL 52BT12A14	10KΩ, Off-Volume	
VR 56	TVZ T0AA00B23M	2KΩ, AVR Control	
	CAPACITORS		
C 101	ECC D05390K	Ceramic, 39pF ±10%	50V
C102	ECC D05151K	Ceramic, 150pF ±10%	50V
C 103	ECC D05180K	Ceramic, 18pF ±10%	50V
C 104	ECC D05150F	Ceramic, 15pF ±10%	50V
C 106	TCK S05503ZM	Ceramic, 0.05μF $^{+80\%}_{-20\%}$	50V
C 107	TCK S05102PM	Ceramic, 0.001μF $^{+80\%}_{-20\%}$	50V
C 108	ECC D05151K	Ceramic, 150pF ±10%	50V
C 109	ECC D05101K	Ceramic, 100pF ±10%	50V
C 110	TCK S05103ZM	Ceramic, 0.01μF $^{+80\%}_{-20\%}$	50V
C 111	TCK S05503ZM	Ceramic, 0.05μF $^{+80\%}_{-20\%}$	50V
C 112	ECC D05470K	Ceramic, 47pF ±10%	50V
C 113	TCK S05103ZM	Ceramic, 0.01μF $^{+80\%}_{-20\%}$	50V
C 114	ECE A6V33N	Electrolytic, 33μF	6V
C 115	TCK S05502ZM	Ceramic, 0.005μF $^{+80\%}_{-20\%}$	50V
C 116	ECE A6V47T	Electrolytic, 47μF	6V
C 117	TCK S05503ZM	Ceramic, 0.05μF $^{+80\%}_{-20\%}$	50V
C 118	TCK S05503ZM	Ceramic, 0.05μF $^{+80\%}_{-20\%}$	50V
C 119	ECC D05080D	Ceramic, 8pF ±0.5pF	50V
C 120	ECC D05080D	Ceramic, 8pF ±0.5pF	50V
C 121	ECC D05220K	Ceramic, 22pF ±10%	50V
C 122	ECK D05472PJ	Ceramic, 0.0047μF $^{+100\%}_{-0\%}$	50V
C 123	TCK S05103ZM	Ceramic, 0.01μF $^{+80\%}_{-20\%}$	50V
C 151	ECS Z10EA1	Solid, Tantalum Electrolytic 1μF	10V
C 153	ECS Z3EA10	Solid, Tantalum Electrolytic 10μF	3V
C 154	ECS Z3EA10	Solid, Tantalum Electrolytic 10μF	3V

SYMBOL	PART NO.	DESCRIPTION
C 155	TCK S05503ZM	Ceramic, 0.05μF +80% -20% 50V
C 156	TCK S05503ZM	Ceramic, 0.05Fμ +80% -20% 50V
C 201	ECC D05150K	Ceramic, 150pF ±10% 50V
C 202	TCK S05102PM	Ceramic, 0.001 μF+80% -20% 50V
C 203	ECC S05151K	Ceramic, 150pF ±10% 50V
C 204	TCC S05503ZM	Ceramic, 0.05μF+80% -20% 50V
C 205	TCK S05503ZM	Ceramic, 0.05μF+80% -20% 50V
C 206	ECS Z6EA4R7	Ceramic, 4.7μF 6V
C 207	TCK S05503ZM	Ceramic, 0.05μF +80% -20% 50V
C 208	TCK S05503ZM	Ceramic, 0.05μF+80% -20% 50V
C 210	ECS Z10EA1	Solid, Tantalum Electrolytic, 1μF 10V
C 211	TCQ M05103MZN	Polyester Film, 0.01μF ±20% 50V
C 212	ECS Z10EA1	Solid, Tantalum Electrolytic, 1μF 10V
C 213	ECS Z6EA4R7	Solid, Tautalum Electrolytic, 4.7μF 6V
C 214	ECE A6V100N	Electrolytic 100μF 6V
C 251	ECS Z10EA1	Solid, Tantalum Electrolytic, 1μF 10V
C 252	ECS Z25EA0R1	Solid, Tantalum Elctrolytic, 0.1μF 25V
C 253	TCQ M05103MZN	Polyester Film, 0.01μF ±20% 50V
C 254	ECC D05560K	Ceramic, 56pF ±10% 50V
C 301	TCQ M05222KZN	Polyester Film, 0.0022μF ±10% 50V
C 302	TCQ M05332KZN	Polyester Film, 0.0033μF ±10% 50V
C 303	TCQ M05223MZN	Polyester Film, 0.022μF ±20% 50V
C 304	ECS Z25EA0R33	Solid Tantalum Electrolytic, 0.33μF 25V
C 305	ECS Z10EA1	Solid Tantalum Electrolytic, 1μF 10V
C 306	ECS Z25EAR047	Solid Tantalum Electrolytic, 0.047μF 25V
C 307	ECE A6V200N	Electrolytic, 200μF 6V
C 308	ECE B50V1N	Electrolytic, 1μF 50V
C 309	TCQ M05223MZN	Polyester Film, 0.022μF ±20% 50V
C 310	ECE A6V200Y	Electrolytic, 200μF 6V
C 311	ECK D05102MY	Ceramic, 0.001μF 50V
C 312	ECS Z25EAR047	Electrolytic, 0.047μF 25V
C 313	ECS Z25EAR047	Electrolytic, 0.047μF 25V
C 401	TCQ M05222KZN	Polyester Film, 0.0022μF ±10% 50V
C 402	TCQ M05103KZN	Polyester Film, 0.01μF ±10% 50V
C 403	TCQ M05223MZN	Polyester Film, 0.022μF ±20% 50V
C 404	TCQ M2102MZN	Polyester Film, 0.001μF ±20% 200V
C 405	ECS Z10EA1	Solid Tantalum Electrolytic, 1μF 10V
C 406	TCQ M05103MZN	Polyester Film. 0.01μF ±20% 50V
C 407	TCQ M05103KZN	Polyester Film, 0.01μF ±10% 50V
C 408	ECS Z25EAR047	Solid Tantalum Electrolytic, 0.047μF 25V
C 409	TCQ M05222KZN	Polyester Film, 0.0022μF ±10% 50V
C 501	ECE A10V100N	Electrolytic, 100μF 10V
C 502	ECE A50V1N	Electrolytic, 1μF 50V
C 503	TCK D5152PM	Ceramic, 1500pF +100% 0% 500V
C 504	TCQ M05153MZN	Polyester Film, 0.015μF ±20% 50V
C 505	TCQ M05102MZN	Polyester Film, 0.001μF ±20% 50V
C 507	ECE B150V1	Electrolytic, 1μF 150V
C 508	TCQ M05104MZN	Polyester Film, 0.1μF ±20% 50V
C 509	ECE A6V200T	Electrolytic, 200μF 6V
C 510	ECC D05820K	Ceramic, 82pF± 10% 50V
C 552	ECE A6V200T	Electrolytic, 200μF 6V
C 553	TCQ M05103MZN	Polyester Film, 0.01μF ±20% 50V
C 601	TCK S05503ZM	Ceramic, 0.05μF +80% -20% 50V
C 602	TCK S05103ZM	Ceramic, 0.01μF +80% -20% 50V
C 603	TCK S05103ZM	Ceramic, 0.01μF +80% -20% 50V
C 604	TCK S05103ZM	Ceramic, 0.01μF +80% -20% 50V
C 605	ECC D05100F	Ceramic, 10pF±1pF 50V
C 606	ECE A10V220N	Electrolytic, 220μF 10V
C 607	ECE A6V1000Y	Electrolytic, 1MF 6V
C 608	ECE A50V1NC	Electrolytic, 1μF 50V

COILS & TRANSFORMERS

L 101	TLI 31051	VIF Input Coil
L 102	TLI 38001	VIF Trap Coil
L 103	TLI 38002	VIF Output Coil
L 104	TLU 101016	100μH
L 201	TLS 34207	SIF Input Coil
L 202	TLS 33216	Discriminator Coil
L 203	TLS 33217	Discriminator Coil
L 251	TLU 101016	100μH
L 501	TLH 3902	Heater Transformer
L 601	TLY 3101D	Deflection Yoke
T 501	TLF 3951-2	Flyback Transformer

IC

IC 11	EHD AR048	Video IF Amp.
IC 12	EHD AW049	Video Output
IC 16	EHD HF050	AGC
IC 21	EHD AR051	Sound IF Amp.
IC 22	EHD AP052	Audio Amp. Output
IC 26	EHD HA053	Sync. Sep. Amp.
IC 31	EHD SN054	Vert. Osc.
IC 32	EHD AP055	Vert. Output
IC 41	EHD SN056	Horiz. Osc.
IC 42	EHD AP057	Horiz. Output
IC 56	EHD RD058	AVR

SYMBOL	PART NO.	DESCRIPTION
	TRANSISTORS & DIODES	
TR 16	TVS 2SA564	Noise Canceller
TR 51	TVS 2SC696Ⓕ	Boost
D 21	TVS 0A90	Ge. Diode
D 22	TVS 0A90	Ge. Diode
D 31	TVS 0A90	Ge. Diode
D 32	TVS 0A91	Ge. Diode
D 41	TVS 0A90	Horiz. AFC
D 42	TVS 0A90	Horiz. AFC
D 43	TVS MA26	Horiz. Osc.
D 44	TVS MA23	Horiz. Damp
D 52	TVS BAX16	
D 53	TVS BAX16	
D 54	TVS RD29AM	
D 55	TVS BAX16	
D 56	ERT D2FGL103S	Thermistor

SYMBOL	PART NO.	DESCRIPTION
	MISCELLANEOUS	
		TV
	TKY 34301-3	Cabinet Body (A)
	TKY 34401-3	Cabinet Body (B)
	TKE 34201-1	Escutcheon
	TKK 30902	Battery Compartment Cover
	TKK 30903	Front Hood with Lens
	TKK 30550	Carry Band
	TKG 30627	Front Glass
	TSE 326	Slide Switch : VHF-UHF Channel Selector
	TBX 3617	Knob : VHF-UHF Tuning
	TBX 3626	Knob : Off-Volume
	TBX 3618	Knob : Contrast
	TBX 3618	Knob : Brightness
	TBX 3618	Knob : Vert. Hold
	TBX 3618	Knob : Horiz. Hold
	IVABP4/S4047	Picture Tube
	TES 3201	Spring (for mounting picture tube)
	TNV 17201E	VHF Tuner
	TNV 87121E	UHF Tuner
	EAS 3P15S	Speaker
	TSA 140-1	VHF/UHF Rod Antenna
	TNP 1122-21	Video & Sound IF P. C. Board
	TNP 1317-1	Deflection P. C. Board
	TNP 1912	Other Printed Circuit Board
	TNP 1913	Other Printed Circuit Board
	TJS 28680	3-p Power Socket
	TJS 25631	Picture Tube Socket
	TJS 28700	External Antenna Socket
	TJS 28700	Earphone Socket
	THE 296-5	Battery Compartment Screw
	TY-701E	NATIONAL Nickel Cadmium Battery Pack
	TNQ 311	Matching Unit
	TY-196E	AC Adapior Complete

REPLACEMENT PARTS LIST OF AC ADAPTOR (TY-196E)

SYMBOL	PART NO.	DESCRIPTION
	RESISTORS	
R 701	ERD 14TJ271	Carbon, 270Ω±5% ¼W
R 702	ERD 14TJ512	Carbon, 5.1KΩ±5% ¼W
R 703	ERD 14TJ220	Carbon, 22Ω±5% ¼W
R 704	ERD 14TJ102	Carbon, 1KΩ±5% ¼W
R 705	ERD 14TJ223	Carbon, 22KΩ±5% ¼W
R 706	ERD 14TJ102	Carbon, 1KΩ±5% ¼W
R 707	ERD 14TJ241	Carbon, 240Ω±5% ¼W
R 708	ERD 14TJ202	Carbon, 2KΩ±5% ¼W
R 709	ERD 14TJ123	Carbon, 12KΩ±5% ¼W
R 710	ERD 14TJ681	Carbon, 680Ω±5% ¼W
R 711	ERD 14TJ681	Carbon, 680Ω±5% ¼W
R 712	ERC 1GJ5R6	Solid, 5.6Ω±5% 1W
R 713	ERC 1GJ3R3	Solid, 3.3Ω±5% 1W
	CAPACITORS	
C 71	ECE B16V2200	Electrolytic, 2200μF 16V
C 72	ECE A10V220N	Electrolytic, 220μF 10V
C 73	ECK D05103PJ	Ceramic, 0.01μF$^{+100\%}_{0\%}$ 50V
C 74	ECK D05103PJ	Ceramic, 0.01μF$^{+100\%}_{0\%}$ 50V
	VARIABLE RESISTORS	
VR 71	EVL T0AA00B13	1KΩ, AVR Control
VR 72	EVL T0AA00B23	2KΩ, AOCP Control

SYMBOL	PART NO.	DESCRIPTION
	TRANSFORMER, TRANSISTORS & DIODES	
T 701	TLP 4229	Power Transformer
TR 71	TVS 2SB126Ⓕ or Ⓥ	
TR 72	TVS 2SC828Ⓠ	
TR 73	TVS 2SC828Ⓠ	
D 71	TVS FR1P	
D 72	EYV 830D030KA	3V Varia
D 73	ERT D2BFL602	Thermistor
D 74	ERT D2BGL251	
D 75	TVM 16C-4B1F	Selenium Rectifier
	MISCELLANEOUS	
	TKK 39910S	AC Adaptor Cabinet (A)
	TKK 39909	AC Adaptor Cabinet (B)
	TBX 3566	Knob : Selector Switch
	TES 147	Rotary Switch
	TNP 1510	AVR & AOCP Printed Circuit Board
	TNP 1511	Pilot Lamp Printed Circuit Board
	TKK 39564	Pilot Lamp Window
	TVL 324	Pilot Lamp
	TJB 3292	Fuse Holder
	TSF 21601-9	Fuse DC 0.6A
	TSF 22101	Fuse AC 0.1A
	TSX 174-1	DC Cord (DC Side)
	TSX 189	AC cord (AC Side)

REPLACEMENT PARTS LIST OF CAR BATTERY CORD (TY-197E)

SYMBOL	PART NO.	DESCRIPTION
	RESISTORS & CAPACITOR	
R 801	ERX 3PSK150	Carbon, 15Ω 3W
R 802	ERD 14TJ102	Carbon, 1KΩ±5% ¼W
R 803	ERC 1GK561	Solid, 560Ω±5% 1W
R 804	ERD 14TJ562	Carbon, 5.6KΩ±5% ¼W
R 805	ERD 14TJ154	Carbon, 150KΩ±5% ¼W
R 806	ERD 14TJ102	Carbon, 1KΩ±5% ¼W
R 807	ERD 12GK221	Carbon, 220Ω±5% ½W
R 808	ERD 14TJ391	Carbon, 390Ω±5% ¼W
R 809	ERC 12GK390	Solid, 39Ω±10% ½W
C 801	ECQ M05223MZ	Poliyster Film, 0.022μF 5W

SYMBOL	PART NO.	DESCRIPTION
	TRANSISTORS, DIODE & VARIABLE RESISTOR	
TR 81	TVS 2SB126 Ⓕ or Ⓥ	
TR 82	TVS 2SA564 Ⓞ, Ⓟ, Ⓠ	
TR 83	TVS 2SC828 Ⓠ	
D 81	EYV 830D030KA	BARIA
VR 81		4.7KΩ
	MISCELLANEOUS	
	TKK 30403	Case
	TKK 30404	Bottom Plate
	TSX 194	Primary Cord With Cigarette Lighter Plug
	TSX 174-1	Seccndary Cord with 3-P Pliug.
	TNP1513	Printed Circuit Board
	TSF 2102-5	1A Fuse
	TVL 328	Pilot Lamp 12V, 27mA
	TKK 39579	Pilot Lamp Window
	TSE 509	Snap-Switch

11. LOCATION OF PARTS

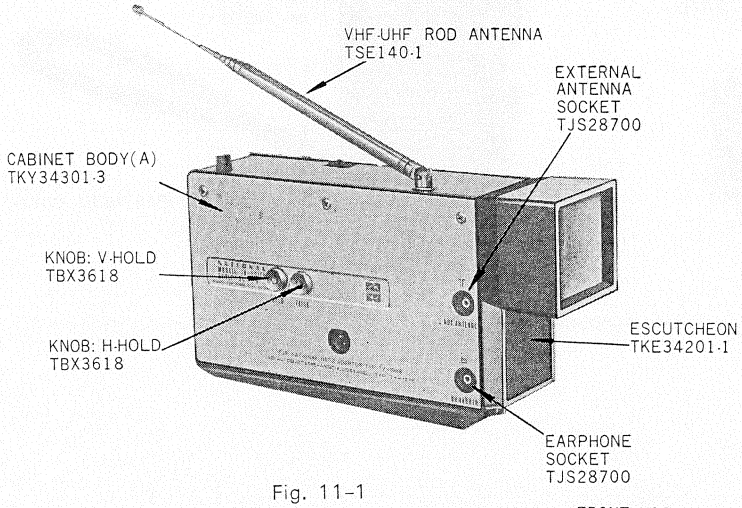


Fig. 11-1

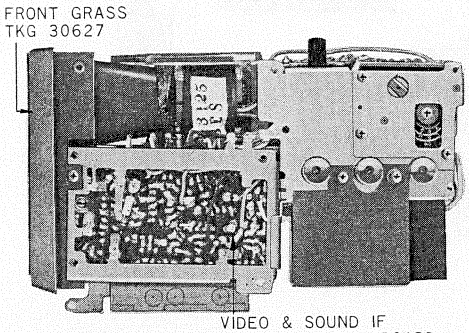


Fig. 11-3

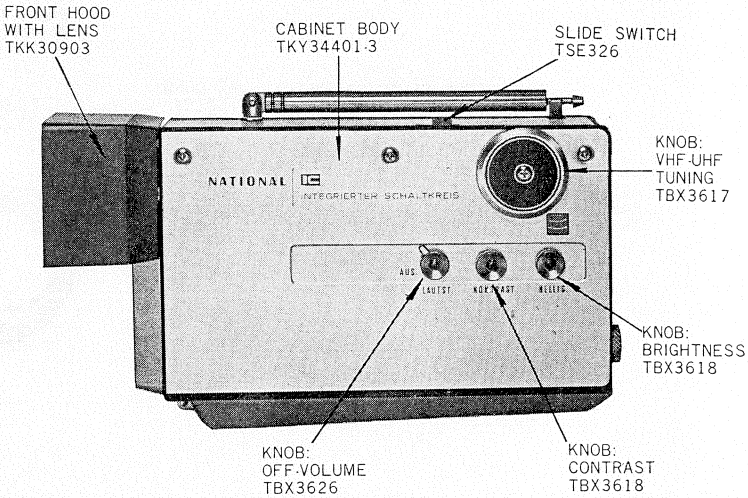


Fig. 11-2

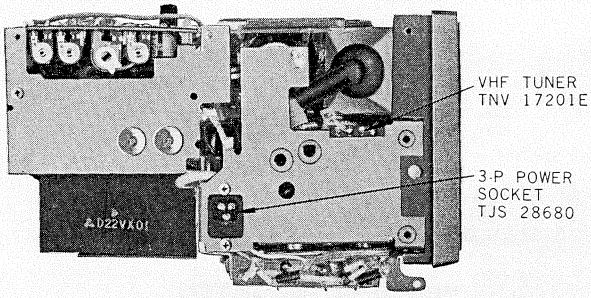


Fig. 11-4

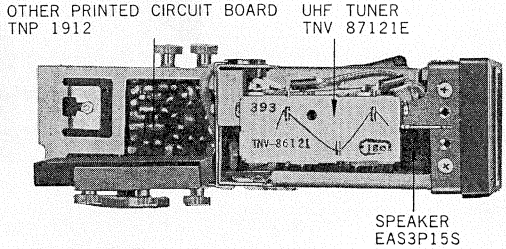


Fig. 11-5

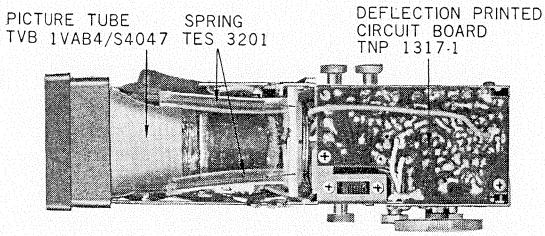


Fig. 11-6

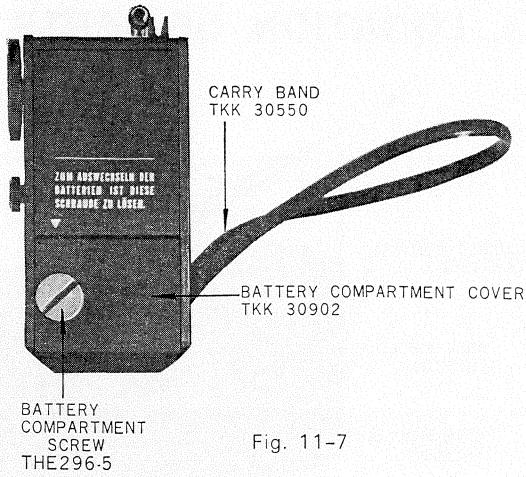


Fig. 11-7

AC ADAPTOR TY-196E

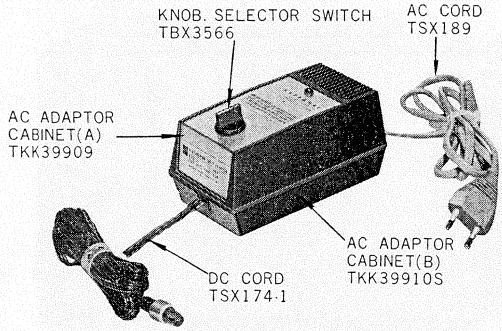


Fig. 11-8

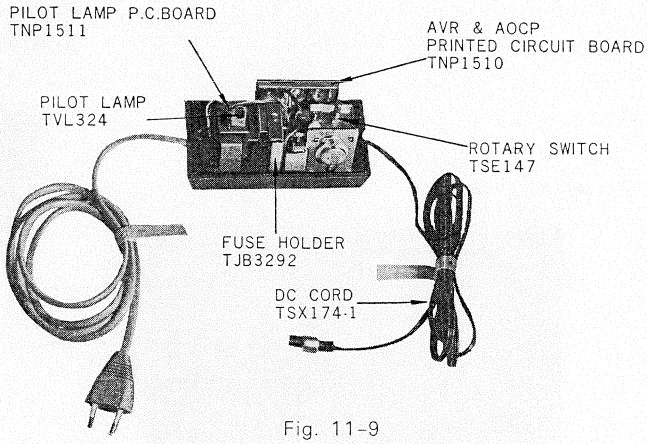


Fig. 11-9

CAR BATTERY CORD TY-197E

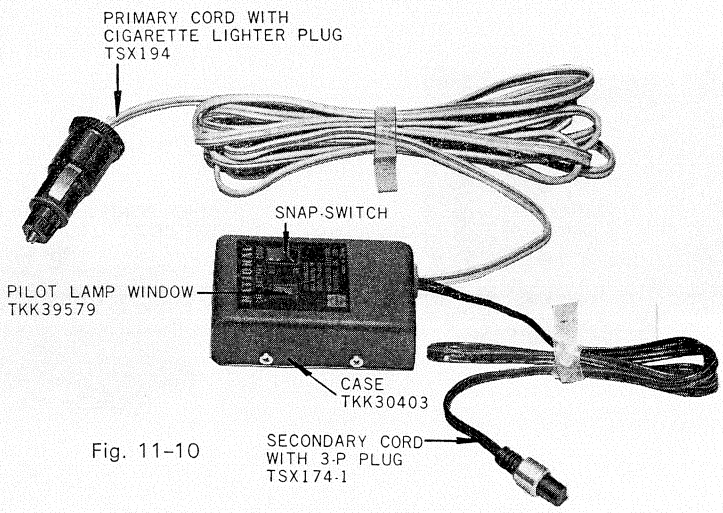


Fig. 11-10

Service Manual

NATIONAL
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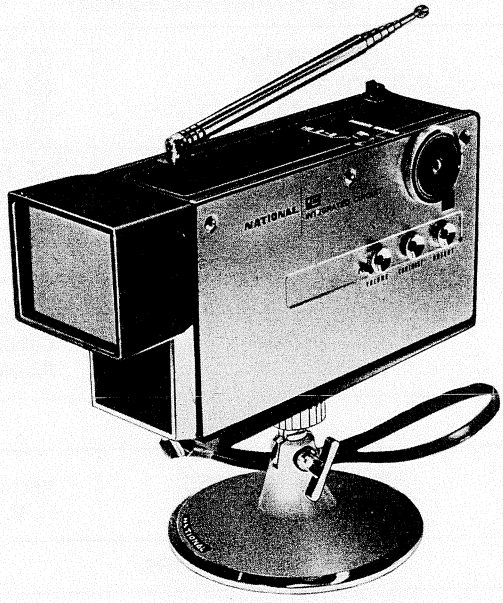
PERSONAL PORTABLE TELEVISION RECEIVER



Supplementary MODEL TR-001EU

SPECIFICATIONS

Power Input Rating	DC:5V, AC:200V 50Hz with AC Adaptor TY-196E, or TY-197E, or 110V, 120V, 220V, 240V 50~60Hz with AC Adaptor TY-196U
Power Consumption	DC:1.7W, AC:9.5W max. with AC Adaptor TY-196E, TY-197E or TY-196U
Antennas	VHF and UHF Rod antenna: 75 Ohm Unbalanced VHF and UHF External antenna 75 Ohm Unbalanced
Channels	VHF 2-12 ch., UHF 21-69 ch., CCIR standard
IF. Frequency	Video 38.9 MHz Sound 33.4 MHz
Integrated Circuits	11
Transistors	8
Diodes	24
H.V. Rectifier	1 block (11 diodes)
Thermistor	1
Picture Tube	1VABP4 36° deflection, aluminized 7cm² Heater Voltage 2.0V Heater Current 90mA
Speaker	3.8cm dynamic
Sound Output	Max. 100mW
Automatic Circuits	Peak AGC AVR (Automatic Voltage Regulator) AOCP (Automatic Over Charge Protector) Automatic Noise Canceller
Dimensions	Height: 17.5cm Width: 10cm Depth: 19cm (with front hood & set stand)
Weight	1.1kg (with Battery & set stand)
Battery	1 (NATIONAL Nickel Cadmium Battery Pack TY-701E

MATSUSHITA ELECTRIC
MATSUSHITA ELECTRIC TRADING CO., LTD.
P. O. Box 288, Central Osaka, Japan

ORDER NO. FTD-710903

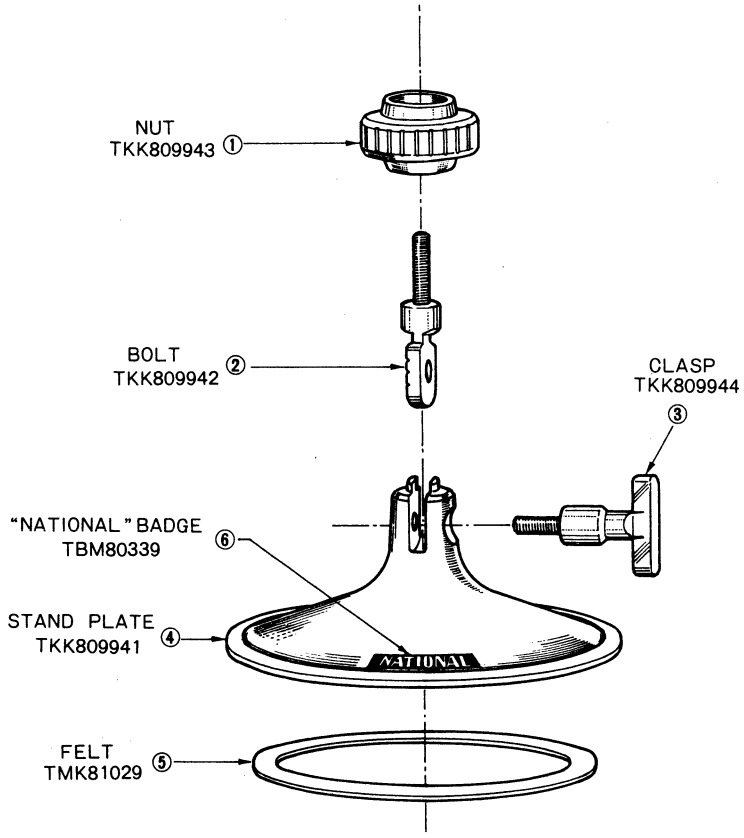
Please refer to the attached current model TR-001EU Service manual.
This model is revised from current model TR-001EU, including the set stand.
The differences between current model TR-001EU and revised model TR-001EU are only the followings.

I. COMPARATIVE PARTS LIST

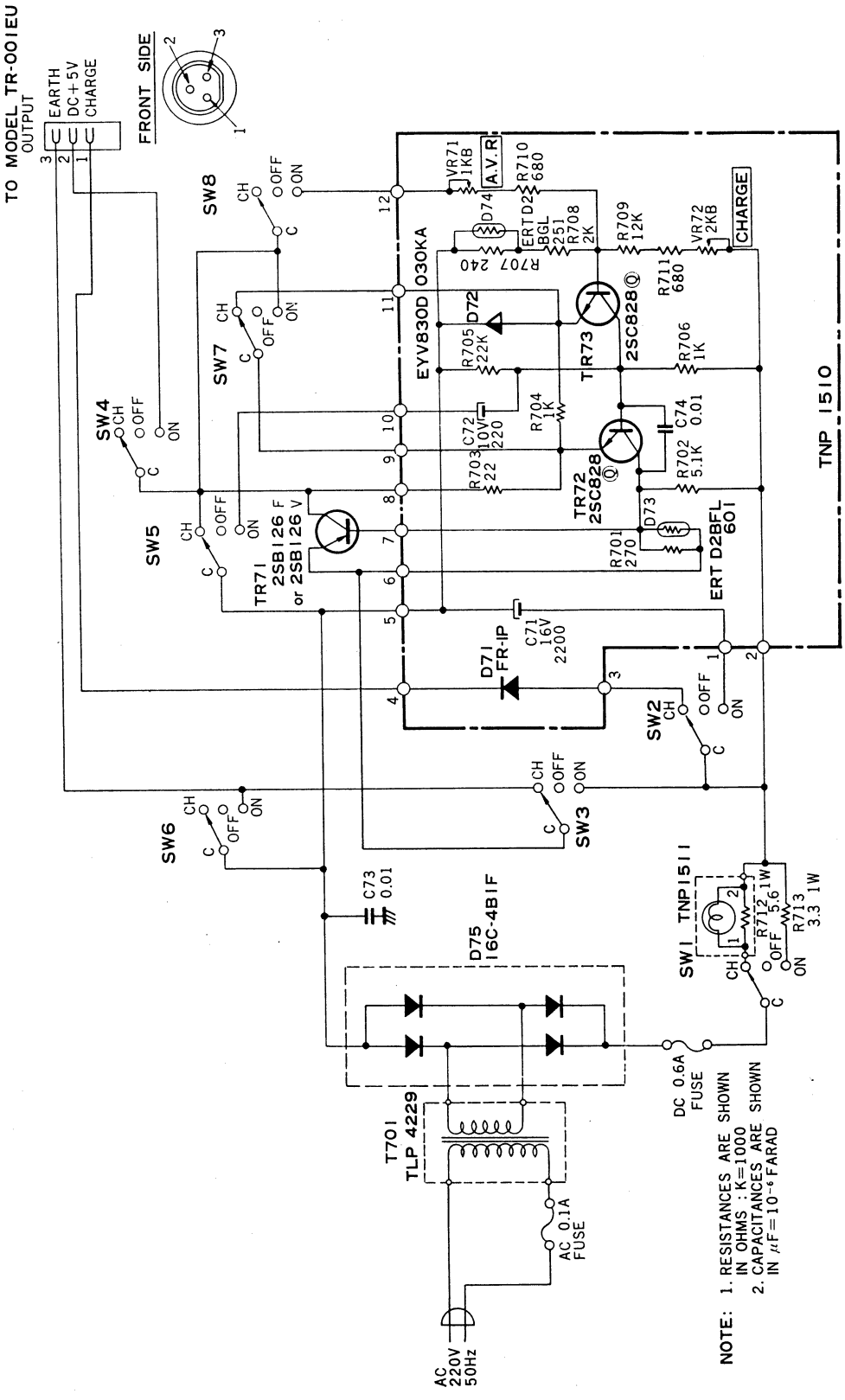
	CURRENT MODEL TR-001EU	REVISED MODEL TR-001EU	DESCRIPTION
		SET STAND (TBL 801104)	
Add	————	**TKK 809943**	① Nut
Add	————	**TKK 809942**	② Bolt
Add	————	**TKK 809944**	③ Clasp
Add	————	**TKK 809941**	④ Stand Plate
Add	————	**TMK 81029**	⑤ Felt
Add	————	**TBM 80339**	⑥ "NATIONAL" Badge
		MISCELLANEOUS	
Alter	TKY 34301-3	**TKY 34302-3**	Cabinet body complete (A)
Alter	TKY 34401-3	**TKY 34402-3**	Cabinet body complete (B)
Alter	EAS 3P15S	EAS 3P15SA	Speaker
		IC & DIODE	
Alter	IC 32 EHD APO55 EXD22VX01	IC 32 EHD APO55G EXD22VX01	Vert. output. H. V. rectifier
		CAPACITORS	
Alter	C302 TCQM05332KZN	C302 TCQM05272MZN	Polyester film, 0.0027μF ± 10% 50V
Alter	C307 ECE A6V200N	ECEA6V220N	Electrolytic, 220μF 6V
Alter	C310 ECE A6V200Y	ECEA6V200X	Electrolytic, 200μF 6V
		RESISTORS	
Alter	R208 ERC16GK331	*R208 ERC16GK331	Solid, 330Ω ± 10% 1/6W
		or ERC16GK102	Solid, 1KΩ ± 10% 1/6W
		or ERC16GK561	Solid, 560Ω ± 10% 1/6W
Add	————	*R309 ERC16GK102	Solid, 1KΩ ± 10% 1/6W
		or ERC16GK122	Solid, 1.2KΩ ± 10% 1/6W
		or ERC16GK152	Solid, 1.5KΩ ± 10% 1/6W
		or ERC16GK182	Solid, 1.8KΩ ± 10% 1/6W
		or ERC16GK222	Solid, 2.2KΩ ± 10% 1/6W
		or ERC16GK272	Solid, 2.7KΩ ± 10% 1/6W
Add	————	R310 ERC16GK273	Solid, 27KΩ ± 10% 1/6W
Add	————	*R412 ERC16GK103	Solid, 10KΩ ± 10% 1/6W
		or ERC16GK123	Solid, 12KΩ ± 10% 1/6W
		or ERC16GK822	Solid, 8.2KΩ ± 10% 1/6W
		or ERC16GK682	Solid, 6.8KΩ ± 10% 1/6W

NOTE * Parts written in gothic in this Comparative Parts List are new parts.
* R208 is used properly to compensate the performance of IC 22 (EHD APO52).
ERC16GK561 in case of IC 22 with red mark.
ERC16GK102 in case of IC 22 with brown mark.
ERC16GK331 in case of IC 22 with no mark.
* R309 is used properly to compensate the performance of IC 32 (EHD APO55G).
* R412 is used properly to compensate the performance of IC 41 (EHD SNO56).

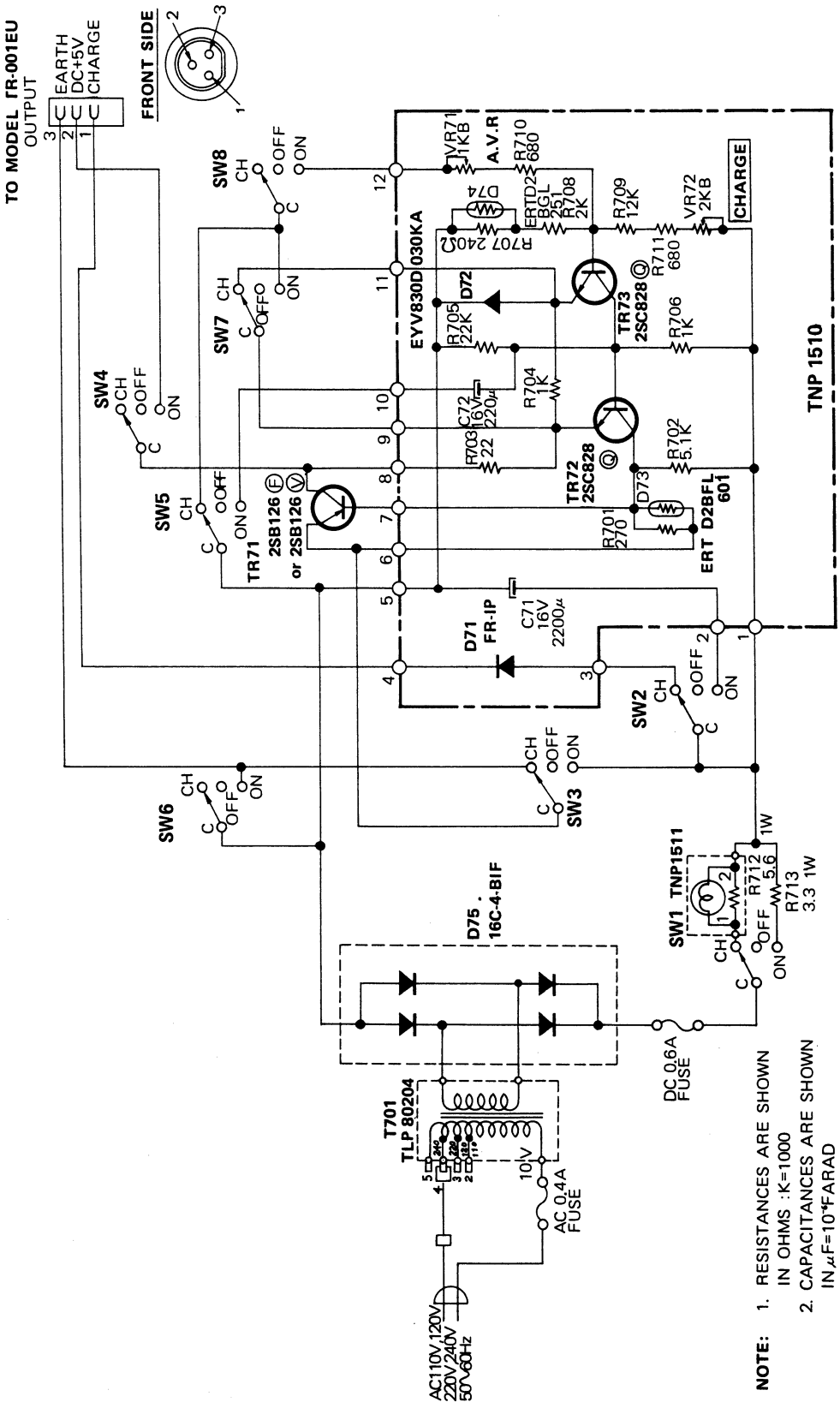
II. ANALYSIS DIAGRAM OF SET STAND



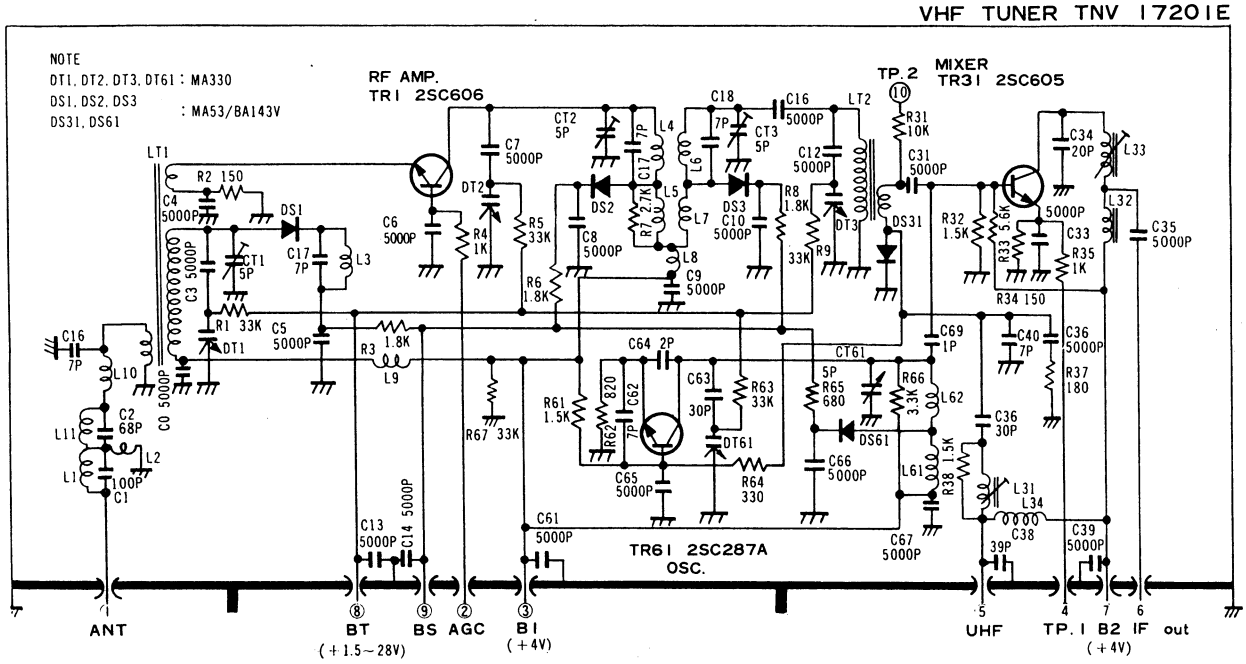
SCHEMATIC DIAGRAM MODEL TY-196E



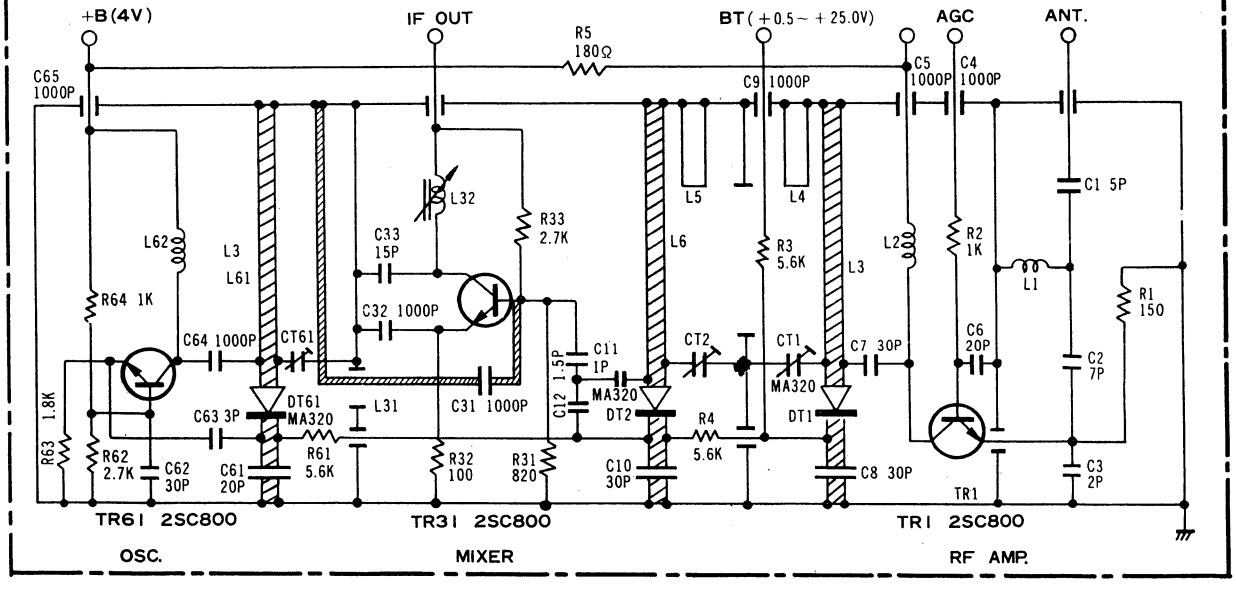
SCHEMATIC DIAGRAM MODEL TY-196U



VHF TUNER TNV 17201E



UHF TUNER TNV 87121E



NOTE:

1. RESISTANCE VALUES ARE SHOWN IN OHMS: K=1000 M=1000,000
2. CAPACITANCE VALUES ARE SHOWN IN μF=10^{-6}F OTHERWISE NOTED P=$\mu\mu$F=10^{-12}F
3. COIL RESISTANCE VALUES LESS THAN 1 OHM ARE NOT SHOWN.
4. DC VOLTAGES ARE READ WITH VACUUM TUBE VOLT METER AND ALL CONTROLS SET FOR NORMAL PICTURE.
5. MARKS-o-o-INDICATE JUNCTION POINT FOR TERMINAL OF THE CIRCUIT BOARDS.
6. THE MARKED *PARTS ARE USED PROPERLY TO COMPENSATE THE PERFORMANCE OF THE IC.

SCHEMATIC DIAGRAM OF MODEL TR-001EU